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A L S O:

*After Rio: Sustaining
Sustainable Development*

*A Promising Pathway
to the Fountain of Youth*

*Building a Smarter
Work Force*

Scientists Meet the Press

*"Car Talk's" Tom Magliozzi
on Dashboards from Hell*

High-Tech Nightingales

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technology review

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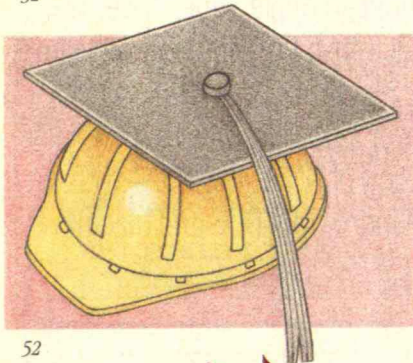
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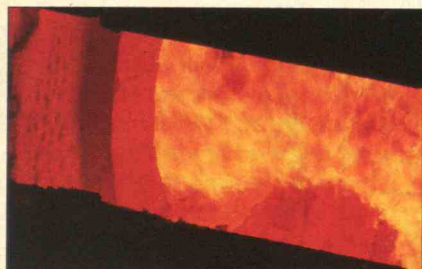
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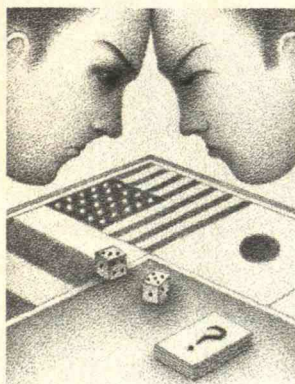
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First Line

Industry's Duty of Care

THE theme of the recent Earth Summit in Rio de Janeiro was "sustainable development." But despite the best intentions of the many governments and public-interest organizations in attendance there, the road to sustainable development has to be paved by industry. Business-as-usual must come to include the widespread use of environmentally sound technologies and practices during all phases of a product's life cycle.

The concept of "duty of care," introduced in the 1990 British Environmental Protection Act, could be of great value in pursuing this goal. Referring to the responsibility of manufacturers to minimize undesirable side effects, duty of care is akin to the U.S. notion of "cradle to grave." Companies must not only provide for the safe disposal of wastes; they must design processes and products to minimize the volume of waste in the first place, and in some cases ensure that the products they make are properly reused or recycled.

Thus, duty of care embodies such goals as preventing pollution ("source reduction"), finding new uses for waste streams, substituting benign materials for those that are toxic, and improving the efficiency and productivity of industrial activities. This is no high-sounding yet hopelessly impractical idea; it in fact reflects a shift in the thinking of leading industrialists. *Changing Course*, for example—a report issued by the Business Council for Sustainable Development in preparation for the Earth Summit—provided examples of a wide variety of actions that companies around the world are taking.

One form of duty of care is manifesting itself in Europe and Japan, where "take-back" or recycling legislation spells out what is expected in responsible industrial practice. Japan's 1991 Law for Promotion of Utilization of Recyclable Resources not only encourages the use of recycled material; it also requires design changes in products—

"design for disassembly"—to make them more easily recyclable at the end of their useful lives. This law applies to such products as automobiles, air conditioners, televisions, refrigerators, and washing machines, and it also embraces packaging.

The German automobile industry is grappling with new waste-disposal requirements under which automakers must take responsibility for disposing of cars after consumers are through with them. BMW claims that its new series of smaller cars will have all-plastic parts

Companies can be the true agents for making "sustainable development" a worldwide reality.

marked so that they may be easily sorted for recycling. Volkswagen recently announced that it will take back all its 1992 Golf models regardless of how long the cars have been on the road. The German legislation will soon cover electronic products as well.

In the United States, several companies are pioneering responsible environmental stewardship, often using catchy acronyms to identify their programs: 3M has 3P (Pollution Prevention Pays), Dow Chemical has WRAP (Waste Reduction Always Pays), and Chevron has SMART (Save Money and Reduce Toxics). As these names imply, companies often find it profitable to reduce waste, especially through improved economic efficiency.

These companies' experience shows that duty of care can take hold in the United States, and that top-level business managers can make the concept a reality if they commit their organizations not only to the promise but to the actual measures needed to follow through.

First, research and development capabilities should be harnessed toward this end. That is already happening in response to local regulation and public insistence on "green" products. The

stringent California standards calling for zero emissions in at least 2 percent of vehicles sold there in 1998 have spurred R&D at U.S. automobile companies. They have pooled resources and expertise for research in areas such as particulate-emissions control and electric-vehicle batteries.

Second and most basic is that companies must now regard the environmental imperative as an integral part of their business goals, and get their suppliers on board as well. Companies should employ a precautionary approach, taking action as soon as they learn that some product or process is environmentally harmful, instead of waiting until forced to do so or until all uncertainties are resolved.

The push to phase out chlorofluorocarbons (CFCs), given their link to the depletion of stratospheric ozone, is a classic precedent. Recognizing the need to reduce the use of CFCs as solvents, electronics companies developed strategies for *eliminating* their use. Independently and through the Industry Cooperative for Ozone Layer Protection, these firms are developing alternative ways of cleaning electronic components that they are passing on to suppliers and spreading to operations abroad. AT&T has led in the development of manufacturing processes that are free of CFCs, and the company is en route to eliminating CFC emissions from all its plants in the United States and abroad.

There is no silver bullet or single approach to realizing the new ethic. Because companies are so diverse, they must all separately address their own particular environmental challenges. Yet when all act individually to reflect duty of care, firms will be able to learn from one another, adopting the "best practices" that emerge in the pursuit of environmental—and economic—excellence. ■

—ROBERT M. WHITE
President of the National Academy of Engineering

—DEANNA J. RICHARDS
Director of the NAE's Technology and the Environment Program

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Letters

RELEVANCE AND RIGOR

For those of us teaching introductory science courses, "Reforming Freshman Science" by Sheila Tobias (*TR May/June 1992*) provides an important message. For some years now, we in the Dartmouth Chemistry Department have been doing exactly the sorts of things Tobias recommends: we have integrated exciting demonstrations into classroom lectures, explained the connections between course material and everyday phenomena, and made ourselves accessible to students. One of our professors has recently developed animated Macintosh software that clarifies freshman chemistry concepts by describing the properties of molecules such as AZT, caffeine, Teflon, and aspirin.



However, the effort to retain more students should not mean that we sacrifice scientific rigor. Unfortunately, many freshmen who have been drawn to science through high school courses designed to pique their interest drop out when faced with the demands of college science. In addition to examining the quality of teaching in freshman science, Tobias and others might look at differences in student attention span and self-discipline over the past few decades. After all, "work overload" and "a punishing pace"—reasons Tobias cites for the diminishing numbers of students in science—are relative judgments. What has changed since 1966, when, as Tobias notes, a proportionately larger number of college freshmen planned to major in science or mathematics? The basic principles of science have certainly remained the same.

DEAN E. WILCOX

Associate Professor of Chemistry
Dartmouth College

WHY SHOULD THEY DO IT IN THE ROAD?

The authors of "The Case for Smart Highways" (*TR July 1992*) provide an excellent discussion of how intelligent vehicle/highway systems (IVHS) might help to alleviate urban traffic congestion.

However, the article is silent on the broader potential of IVHS. For example, IVHS could greatly enhance commercial vehicle fleet management, improve driver/operator and public safety, and provide for more effective and efficient regulatory operations.

The broader benefit to safety is briefly mentioned but more in the context of a byproduct of reduced congestion. IVHS technologies are expected to substantially improve motorist safety in both urban and rural locations. Not only radar braking, but vision-enhancement systems and in-vehicle motorist information systems, which provide critical advisory and warning messages, are just some of the many examples of potential future applications.

LYLE SAXTON

Director

IVHS Office of Safety and

Traffic Operations R&D

Federal Highway Administration

Before spending billions of dollars refitting the country's highways and vehicles to make them "smart," the American public might want to consider the faulty logic and bogus salesmanship behind the idea.

Smart highways would supposedly unspool traffic. But such has been the promise of nearly every urban highway project since the 1940s, and history has shown that these fixes have been quickly overwhelmed by the increased traffic they themselves generate. Highway improvements are not the answer to traffic jams. Mass transportation is. Moreover, it's questionable whether our highway system, which is already collapsing under the weight of age and poor maintenance, could even meet the challenge of so much extra traffic.

Another problem is that we have little experience with the mass psychology we would invoke by coordinating large-scale traffic flow. Would drivers submit to being herded like sheep by a centralized computer? Or would the game of "out-smarting" the smart highways—by doing the exact opposite of what the computer suggests—thwart the system?

And what if the system failed? Even a single major breakdown during the transition to it could destroy drivers' confidence in the technology. Or if failure occurred after the public had become dependent on the system, chaos could result.

But the most important objections to the smart-highway proposal concern who would pay and who would benefit. It's obvious who would pay: consumers. To justify the enormous public investment in highway refitting, government authorities would have to persuade or force large numbers of people to buy computer-navigated cars. Increased tolls, gas taxes, and extra charges for driving at peak hours could also help, but as the authors admit, these regressive financing solutions have already been rejected by communities like Madison, Wis., Berkeley, Calif., and Honolulu, Hawaii.

As for who would benefit from smart highways, it's clear that the transportation industry would. Car-makers would have the opportunity to sell a whole new fleet of vehicles. Other companies would get lucrative contracts to install sensing, computing, and communications devices in highways. Not surprisingly, GM, Motorola, and the other companies who stand to gain are the ones sponsoring the necessary "R&P"—research and publicity. The whole scheme is reminiscent of the GM pavilion at the 1939 World's Fair, where elaborate dioramas showed GM cars speeding along the 16-lane superhighways of the future, all to be built at taxpayers' expense.

WADE ROUSH
Program in Science,
Technology, and Society
MIT



"The Case for Smart Highways" implies that it's a good idea to continue to rely heavily on auto transportation. But this goes against any kind of sound thinking on ecological or economic issues. Rather than investing billions in IVHS, why not improve and expand light and heavy rail?

ANDREW MARK
New York, N.Y.

BRAVE NEW WORKPLACES

In "Post-Industrial Society Defined" (*Letters*, TR May/June 1992), Prof. Daniel Bell takes me to task for questioning the idea of a post-industrial society. In fact, I did not have Bell's justly famous thesis in mind so much as the legion of essays that have since drawn on the idea of post-industrialism to rationalize the decline of U.S. manufacturing excellence.

These essays commonly suggest that there is a kind of zero-sum game between service and manufacturing growth, determined by market forces. But many economists, including myself, have countered that the explosive growth of financial, management, and legal services since the late 1960s is directly related to a qualitative transformation in the nature of manufacturing, not to its demise. Manufacturing and related activities such as distribution now take place among and within companies that span regions, countries, and even continents, and those companies concern themselves with many different economic sectors as well. Coordinating the complex interac-

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MIT Reporter

SPINNING OFF HEAT WITH LESS POLLUTION



Like a miniature tornado, the tunnel-shaped flame blazing in an experimental burner rotates furiously, spun by precisely aimed jets of air. According to MIT's Janos Beér, professor of chemical engineering, and Majed Toqan, manager of the Institute's Combustion Research Facility, the burner's design could substantially reduce the amount of polluting nitrogen oxides emitted by utilities and industry as they produce power and run manufacturing processes.

When virtually anything burns, gaseous nitrogen, which makes up 79 percent of the atmosphere, mixes with the oxygen in the burning mixture to generate nitrogen oxides (NO_x). Nitrogen-containing fuel such as coal and oil produce even more NO_x . And in sunlight, the NO_x can mix with hydrocarbons from, say, automobile fuel to form ground-level ozone, which causes respiratory stress and other health problems. Nitrogen oxides are also components of acid rain.

In conventional burners, fuel and air mix vigorously from the start. This makes for efficient combustion but also provides the right conditions—high temperatures and plenty of oxygen—for NO_x formation. The patent-pending “radially stratified flame core burner” invented by Beér and Toqan delays this mixing and thus limits the formation of nitrogen oxides.

“What we are doing is ‘staging’ the combustion,” shouts Beér, peering through a thick piece of dark glass at the roaring, orange flame as it gyres out of the fuel nozzle. In the first stage, the rotation of the cylindrically shaped flame pushes the relatively cool, dense air simultaneously piped into the combustion chamber to the outside of the flame, almost completely separating the fuel from the oxygen. Inside the heat of 1,200-1,500 °C exists a calm zone, much like the eye of a hurricane, where the fuel pyrolyzes, or breaks apart chemical bonds in the absence of oxygen. This

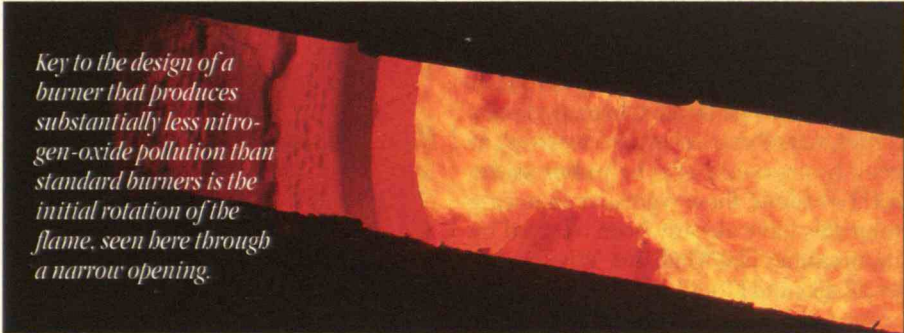
creates a waste product of inert nitrogen gas along with heat.

About three feet beyond the fuel nozzle, Beér explains, the flame “blossoms out” and collapses into a doughnut-like shape. In this second stage, air mixes with the pyrolyzed fuel, which ensures that the fuel is burned completely. Carbon dioxide and water are the primary waste products.

The experimental burner can use natural gas, oil, or pulverized coal as a fuel with only minor adjustments. With natural gas, the burner emits as little as 14 to 16 parts per million nitrogen oxides, a significant reduction from the 200 ppm generated in a conventional burner. Burning oil yields about 80 ppm compared with as much as 600 ppm otherwise.

regional ozone limits. Meanwhile, state governments in the Northeast and California, where ozone levels are consistently above safety standards, have imposed local regulations. California power plants burning natural gas, for example, are limited to 30 ppm nitrogen oxides in their emissions; oil burners to 100 ppm.

Some burners already on the market reduce industrial NO_x emissions by adding ammonia, which reacts with nitrogen oxides to form nitrogen gas. But, Toqan says, these systems have a disadvantage, since ammonia is an additional and hazardous material. Other low-nitrogen burners use separate chambers for different combustion stages, a technique that the MIT researcher claims requires more space



Key to the design of a burner that produces substantially less nitrogen-oxide pollution than standard burners is the initial rotation of the flame, seen here through a narrow opening.

Following laboratory research, the next step is building an industrial-scale burner. ABB Combustion Engineering in Windsor, Conn., plans to scale up the burner from its current 5 million Btu per hour capacity to 80 million Btu per hour. (By comparison, a typical home water heater produces 5,000 to 10,000 Btus per hour, while a small electric-utility boiler might produce the equivalent of 1 billion Btus per hour.) Southern California Edison has agreed to test several of the 80-million-Btu burners on a boiler that generates electric power.

“We’re going to be getting more and more calls for low-nitrogen oxide burners,” points out Dick Borio, ABB’s executive consulting engineer. “It looks like the handwriting is on the wall because of the new Clean Air Act,” which imposes

than his system and leads to less efficient burning. Still other burners employ catalysts, much like those in the catalytic converter included in all cars built after 1975, again to form nitrogen gas. Although some of these burners produce, with natural gas fuel, as little as 10 parts per million of NO_x , they can cost 10 to 50 times more than the MIT burner is expected to cost, per ton of avoided NO_x , according to Toqan.

“Combustion-modification techniques like those in the radially stratified burner will most likely give the best bang for the buck,” says Angelos Kokkinos, the air-quality control project manager for the Electric Power Research Institute. “If the results we’re seeing from MIT follow up in a larger-scale application, we will be very interested in this burner.”—P.J. SKERRETT

JOINT STUDIES



Exercise may be good for the heart, but it can be hard on the joints. Some high-impact sports like running can cause injuries that doctors think may lead to arthritis. But by the time osteoarthritis, the form of the disease that typically afflicts athletes, is diagnosed, it has often progressed so far that the only treatments are pain relievers and, in some cases, joint replacement.

To ultimately help doctors recognize osteoarthritis earlier and prescribe proper levels of exercise to people with any form of arthritis, Martha L. Gray, assistant professor of electrical engineering at MIT, and her colleagues are researching cartilage. That tissue, which resembles a fluid-filled sponge, normally acts as the body's shock absorber by protecting bones from excessive force.

Osteoarthritis occurs when cartilage degrades and unprotected bones rub together. Gray and Deborah Burstein, a specialist in nuclear magnetic resonance (NMR) at Boston's Beth Israel Hospital, are using an NMR machine to track early degeneration in cartilage. The NMR's magnetic field provokes a signal whose strength corresponds to the amount of sodium in the cartilage fluid. From this the researchers can determine the amount of glycoaminoglycan (GAG) present—without enough GAG, the cartilage loses its ability to support weight and arthritis sets in.

The research has so far been confined to cartilage tissue samples, because the limits of NMR preclude anything more.

In a related project, Gray is working with Lee Gehrke, associate professor in the Harvard-MIT Division of Health Sciences and Technology, to study the effect of mechanical forces on cartilage samples treated with interleukin-1 (IL-1). Found in arthritics' joint fluid, IL-1 both degrades the cartilage and slows further GAG synthesis. The research, says Gray, could indicate how exercise "modulates the effect of IL-1" and in turn affects people with arthritis. Although exercise usually makes healthy

cartilage grow stronger, it may cause cartilage damage in the presence of IL-1.

Gray and Gehrke grow IL-1-treated cartilage samples for about two weeks. During this period they regularly measure how much force a motor-driven machine uses to compress the tissue to a particular thickness for a set period of time. They also measure the force needed to squeeze the tissue repeatedly, a motion that mimics walking or running.

Despite suffering from arthritis, this athlete continues to run marathons. Cartilage research by MIT professor Martha L. Gray and her colleagues could ultimately enable early detection of the problem, or at least help indefatigable athletes to live with it.



The less force needed, the weaker the tissue, and the more extensive the arthritis.

Future work could focus on possible correlations between levels of exercise and arthritis-like conditions in live lab animals. Their cartilage could later be removed for further study. And to study early cartilage degeneration in living people, Gray hopes that magnetic resonance imaging (MRI) systems, into which people can be inserted, can eventually be employed. MRI, sometimes confused with NMR, usually produces images by calculating the amount of water present; Gray might explore whether it is possible to identify GAG levels based on the amount of water in cartilage. Alternatively, adequate imaging techniques that look at sodium concentrations could become available.

—DEBRA ROSENBERG (The author is a reporter for Newsweek.)

A LITTLE BYTE MUSIC



When Tod Machover was a student at the Juilliard School in 1974, he composed a string trio that was virtually impossible for people to perform. The piece called for three musicians to play at different tempos that accelerated or decelerated, but not in unison. In order to hear this unwieldy music, the composer had to program a computer that generated the sounds synthetically. From then on, says Machover, now an associate professor of music and media at MIT, he knew that computers would play an essential role in his avant-garde music.

Machover's compositions have more recently led him to develop "hyperinstruments"—traditional instruments like violins and guitars souped up through their connection to an ensemble of commercially available computers, synthesizers, playback devices (containing recorded clips of sounds), and other electronic gadgetry. Much like a conductor leading an orchestra, a musician can control the entire electronic ensemble through a hyperinstrument.

Machover has designed the computerized instruments to be natural exten-



Musician Tod Machover creates electronic musical ensembles by connecting traditional instruments to computers, playback devices, and other electronic systems.

sions of the original instruments. With the hypercello, for example, a cellist can issue commands through bowing style: smooth and clipped playing techniques elicit different responses. A hodgepodge of sensors attached to the cello and the cellist's bowing hand monitor the bow position, the angle of the bowing wrist, finger pressure on the bow, finger position on the strings, and the loudness and pitch of each of the four strings.

This information is fed into a Macintosh personal computer outfitted with additional hardware and software to change analog measurements of elements such as finger pressure into digital data. The computer analyzes these data and then, using a score stored in its memory, figures out the proper musical responses. For example, if the cellist plays an F-sharp at a specific point in the music, the synthesizer may respond with a rapid succession of tones based on that note. But the hyperinstrument is not just a dummy accompanist. If the F-sharp is played forcefully, the synthesizer might produce the notes more quickly or with a different tone than if the F-sharp were played delicately.

The musician controls the performance by learning about the variety of possible electronic responses beforehand, though Machover says it is often hard to find the right balance between

what the musician and the hyperinstrument should do: "If the hyperinstrument does too much, the instrument becomes complicated and difficult to play, and the musician feels useless. But if the instrument does too little, then the musician will say, 'Why do I need all this garbage? I can do the same thing myself.'"

So far, Machover's instruments and music have gained widespread acceptance. His opera *VALIS*, scored for hyperinstruments, won a favorable review from *The New Yorker* in 1989, Yo-Yo Ma debuted the hypercello at Tanglewood in 1991, and the Los Angeles Philharmonic premiered the use of Machover's hyperviola earlier this year.

Many in the industry assert that computerized instruments such as Machover's are here to stay because they expand musicians' expressive abilities beyond the limits of traditional acoustic instruments. "We need new instrument sounds and new compositional controls," says Herbert Deutsch, music critic for the *American Record Guide*.

Not everyone shares Machover's approach, however. While Machover favors developing instruments for virtuosos, some researchers such as Max Mathews, professor at Stanford's Center for Computer Research in Music and Acoustics, are inventing instruments geared for amateurs. Other researchers are designing instruments that can improvise by themselves, unlike Machover's preprogrammed devices.

Meanwhile, Machover is developing a hyperviolin that he says will be more sophisticated than its stringed predecessors. For one thing, faster workstation hardware available off-the-shelf and more refined software written by MIT research assistant Joseph Chung should enable the instrument to follow a musician even during fast and complicated passages. (During the performance of such music, the hypercello has a tendency to miss a note or two.) The improvements should allow Machover to realize a concerto he is composing that contains many short, intricate musical phrases.—ALDEN HAYASHI



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Trends

A Sharper Image of the Cosmos

Ever since Galileo turned his first simple telescope skyward almost four centuries ago, astronomers have been hampered by the atmosphere, which blurs their view of the stars. But an emerging technology is allowing researchers to eliminate the twinkle caused by atmospheric distortion and gain a sharper, more penetrating view of the cosmos that was once thought possible only from space telescopes.

Called adaptive optics, the technology has at its heart a 4-inch deformable mirror whose surface can be reshaped hundreds of times each second to neutralize the atmospheric effects. In the most advanced systems, a laser is bounced off the upper atmosphere and back to light sensors inside a telescope. A computer then analyzes the reflected light and reshapes the mirror by using hundreds of tiny mechanical fingers that tweak the surface by as little as one one-thousandth of a millimeter.

The starlight reflected by this mirror is so clear and sharp that it looks to the observer as if the atmosphere has been peeled away. In fact, astronomers estimate that the technique can allow telescopes on earth to see images 10 to 20 times sharper and 100 to 400 times fainter than they do now.

Adaptive optics was originally developed during the 1980s as part of the Strategic Defense Initiative (SDI). The technology was designed as a means of viewing foreign satellites in orbit and focusing laser beams fired into space so sharply that they could disable missiles at great distances.

In one of the first large-scale civilian applications, Harvard University astronomer Sallie Baliunas plans to use an SDI system—adapted this past spring to sharply focus a portion of the viewing area provided by the 60-inch telescope at the Mount Wilson Observatory near Pasadena, Calif.—to try to discover new planets in distant star systems or to witness the birth of planets in accreting stel-



lar gases. She also plans to chronicle events on planets in the earth's own solar system, including such phenomena as dust storms on Mars, weather on Jupiter, and volcanic eruptions on Jupiter's moon Io.

Many projects with adaptive optics will probably involve infrared light, as fewer sensors are needed to register infrared's longer wavelength. Infrared light is also distorted less by the atmosphere than visible light, which because of its shorter wavelength is more likely to be deflected by atmospheric gas particles. The first infrared explorations using the high-resolution technique may include looking at the births of stars in the gaseous, interstellar nurseries, given that infrared waves can more easily penetrate the veils of gases in these regions.

Other applications will soon follow. For example, adaptive optics could help resolve the tens of thousands of individual stars within the white glow of the globular cluster near the center of the galaxy. The effect is that of a zoom lens focusing in on previously unattainable details.

Specific projects are hard to predict

Before and after: At Mount Wilson Observatory, a telescope equipped with a computer-controlled deformable mirror is capable of compensating for atmospheric distortion. The blurry image (left) is sharpened by a factor of 10, revealing the binary star Coronae Borealis (right) some 450 light years from earth.

because the few fully operational systems are just starting to become available. Besides the military system on loan to Mount Wilson, others are currently open to researchers at Kirtland Air Force Base in New Mexico and at the University of Chicago. A system designed at MIT's Lincoln Laboratory has yet to be assigned to a research team. And another, built by ThermoTrex Corp. of San Diego, remains with the company.

Besides offering improved resolution, adaptive optics systems are much less expensive—and less risky—than space-based telescopes. While the custom-made military prototypes cost a few million dollars apiece, the Hubble orbiting space telescope has thus far cost \$1.5 billion, and problems with the flawed optics have yet to be resolved. Astronomers are also endeavoring to con-



struct simpler adaptive optics systems for a few hundred thousand dollars each. This effort is accelerating as the Department of Defense declassifies SDI research and industrial suppliers offer crucial parts, including deformable mirrors, at lower costs.

Such ground-based telescopes can be built larger than those in space. In fact, adaptive optics could finally allow existing giant telescopes to fulfill their viewing promise. Because of atmospheric blurring, the largest telescopes now offer no better resolution than a backyard telescope a few inches in diameter. A larger mirror enables astronomers to see fainter, more distant objects because it collects more light, but it cannot provide any more detail than a smaller one when trained on a nearby galaxy such as Andromeda.

A key issue in the technology's evolution is whether to use a laser as a guide for correcting the distortion or to rely on an actual star. The military used both approaches, but found that lasers offered a more dependable source of the intense light required for accurate computer analysis. The laser can also be pointed to a region of sky that might

have only dim guide stars.

On the other hand, lasers are expensive and complex, thereby requiring more operators. Edward Kibblewhite at the University of Chicago and François Roddier of the University of Hawaii are therefore designing systems that would rely on a guide star. Instead of bouncing a laser off sodium atoms some 50 miles up in the atmosphere, the computer would consider the star a sharp point of light and compensate for any blurring that has occurred. To succeed, these systems would require better light sensors to register the fainter guide stars.

As promising as adaptive optics seems, it has important limitations. The corrected field of view astronomers see in the sky covers only a partial area of a large telescope's field of view, smaller than some galaxies appear.

Researchers are already developing systems with several deformable mirrors to expand the viewing area. But even then, space telescopes will retain some advantages. They can see ultraviolet light, which the atmosphere filters. And, of course, adaptive optics is of little use against clouds.

—DAVID GRAHAM

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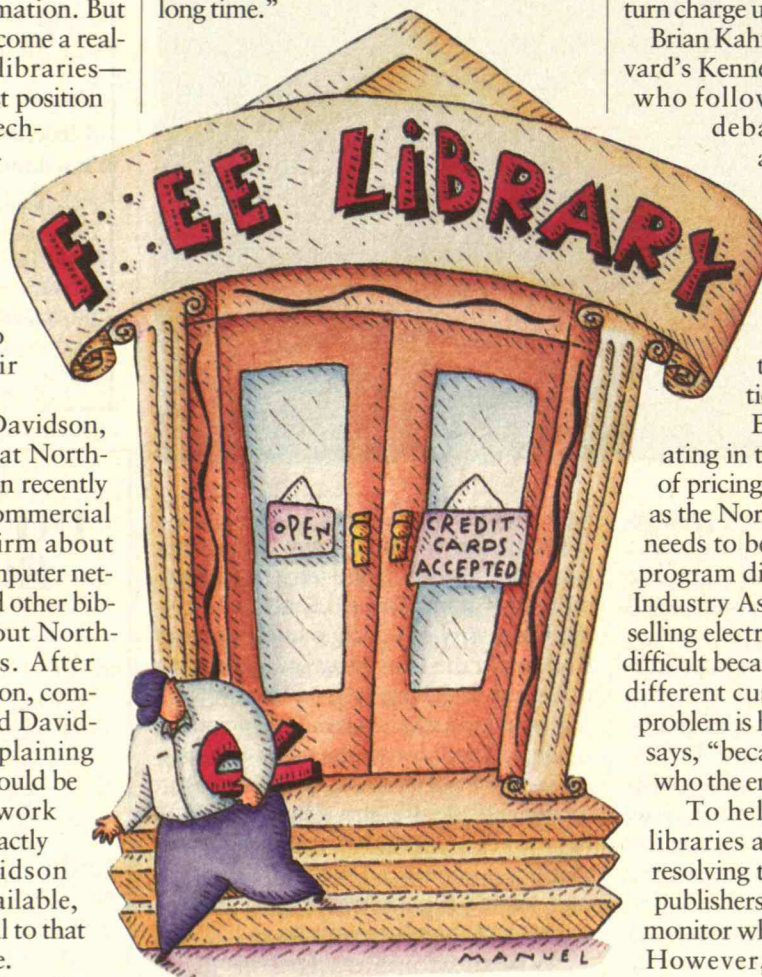
Computer experts have long offered rosy predictions about the ability of electronic networks to expand the public's access to information. But now that the promise has become a reality, public and academic libraries—which are perhaps in the best position to take advantage of the technologies—are finding it difficult to enter the digital age. In their quest to make electronic information freely and easily available, librarians feel restrained by publishers who wish to maintain control of their materials.

Take the case of Lloyd Davidson, head life-sciences librarian at Northwestern University. Davidson recently approached a prominent commercial publishing and database firm about using, on a campus-wide computer network, the firm's citations and other bibliographic information about Northwestern faculty members. After several months of deliberation, company representatives quoted Davidson a price of \$30,000, explaining that since the information would be placed on a computer network and they couldn't be sure exactly how many records Davidson would ultimately make available, they had to charge a fee equal to that for buying the entire database.

"It sounded like extortion," says Davidson, explaining that he merely wanted access to about 1,000 short computer records all derived from the open literature. When he complained about the offer, the firm came back with a new one: they said he could have the records for free. But, Davidson says, they imposed so many qualifications, including a possible time limit of one year for use of the material, that he abandoned the project altogether.

The case is a small example of a contentious broader debate. "Proprietary

information and copyright in the computer age run right up against American values of free access to information," says Karen Muller, spokesperson for the American Library Association (ALA). "The issue is cutting to the core of the way librarians have operated for a very long time."



In fact, ever since the first library was founded by Benjamin Franklin in 1731, libraries have held a revered status. They have since been protected by copyright law, which maintains that after a work has been purchased, it can be loaned and borrowed freely.

Owners of the new electronic media, however, see their role much differently from that of traditional publishers. To protect their rights to the material, electronic publishers increasingly seek to control access to information, selling use

of the material rather than the product itself.

Thus these publishers are establishing arrangements with libraries that include so-called "metered access" to information, in which libraries are charged on a pay-per-view basis. The libraries must in turn charge users to cover costs.

Brian Kahin, a research fellow at Harvard's Kennedy School of Government who follows the "fee-versus-free"

debate, maintains that such arrangements "threaten to change the nature of the library. Instead of a public repository offering free access to the resources it owns, it now becomes a mere gateway that charges for information held by others."

Even if libraries begin operating in this new capacity, the issue of pricing—a major stumbling block as the Northwestern case illustrates—needs to be resolved. Michael Atkin, program director for the Information Industry Association, points out that selling electronic information is always difficult because it has unequal worth to different customers. "But the pricing problem is heightened for libraries," he says, "because no one knows exactly who the end users will be."

To help set reasonable fees for libraries and perhaps move toward resolving the larger debate, electronic publishers would like to more closely monitor who taps into their databases. However, many librarians would resist any such efforts because they would violate the venerated privacy-of-access principle.

"Until now we've been able to hold out for privacy when the FBI comes and says 'show me who reads books on explosives,'" says Patricia Berger, former ALA president and currently a director at the National Bureau of Standards. "But if private firms are able to track who gains access to what information, it will be hard to keep such matters private in the future."

—SETH SHULMAN

Pollution-Prevention Power to the People

■ Citizen groups across the country are hacking their way through the regulatory bureaucracy and taking environmental data into their own hands—via the phone lines. In fact, anyone with a computer and a modem can tap into the Toxics Release Inventory (TRI)—a nationwide database of chemical emissions compiled by the Environmental Protection Agency—and create profiles of emissions by state, type of release, industry, or individual facility.

The TRI database is a major component of the Emergency Planning and Community Right-to-Know Act (EPCRA), which requires manufacturing facilities that release any of 300 chemicals to file an emissions report with the EPA. This act, which was passed in 1986 as part of the Superfund amendments, replaced a patchwork of state right-to-know laws that usually granted citizens access to such information only if they could show sufficient threat to human health.

The database can be tapped through the National Library of Medicine's Toxicology Network (TOXNET) or other networks, like the Right-to-Know Network (RTK Net) in Washington, D.C., which also provides supporting materials, conferences, hotlines, and other databases.

TRI data can reveal that a single facility is virtually responsible for an entire county's toxic emissions. For example, the American Cyanamid Plant in Westwego, La., which emitted a higher volume of TRI chemicals than any other facility nationwide during 1990, accounted for 98 percent of all TRI emissions in Jefferson County. In Texas, one Monsanto facility accounted for 78 percent of Brazoria county's emissions.

Conversely, the previous year's data showed that just 0.6 percent of the facilities accounted for 59 percent of the total decrease in TRI emissions nationwide. In fact, one EPA analysis concluded that "often the large changes in TRI amounts

reported by individual facilities involved a single chemical and a single route of release or transfer."

Citizen organizations have been using TRI figures to successfully target their communities' biggest polluters. The Silicon Valley Toxics Coalition found that IBM's plant in San Jose was the single largest emitter of chlorofluorocarbons in California. Applying public pressure, which culminated in a march on the plant, the group convinced IBM to agree to a complete phaseout of CFCs by 1993, substituting a water-based process for cleaning electronic parts. The coalition has since published a guide for other communities interested in using the TRI database to fight pollution.

For all of its capacity to identify major emitters, TRI data can be inconclusive or misleading. For instance, the inventory does not include details on a facility's production processes, capacity, or pollution-control technology, all of which can significantly influence the amount of chemicals emitted. Nor does it list the releases from power plants, incinerators, mining operations, government agencies—including the vast industrial facilities of the Department of Defense—or manufacturing industries with 10 or

Robert Sargent (center) of the Massachusetts Public Interest Research Group distributed information from the Toxics Release Inventory to rally support for legislation forcing companies to disclose detailed pollutant-emissions data.



fewer full-time employees. Consequently, the U.S. General Accounting Office estimates that TRI covers only about 5 percent of all U.S. chemical emissions.

Furthermore, the database is composed of "voluntary" data, since the EPCRA requires firms to supply only "reasonable estimates" for their toxic releases and transfers. Actual figures are required only when they are already available.

Citizen groups are seeking to address these shortcomings. "We have used TRI data to push for new legislation that would force companies to report not just their releases into the environment, but also their actual chemical use on a process-level basis," says Robert Sargent, director of the Toxics Program at the Massachusetts Public Interest Research Group. The organization distributed TRI data in its successful campaign for the passage of the state's Toxics Use

Reduction Act, which requires companies to improve the efficiency of processes involving toxic chemicals.

Similar legislation is being introduced in other states as well as at the national level. For example, an amendment to the federal Resource Conservation and Recovery Act bill, currently awaiting reauthorization by Congress, would require facilities in several additional industrial categories—including federal and waste-disposal operations—to report TRI data. The law would force all such facilities to meet emission standards currently being established by the EPA. And it would require them to report toxic chemical-reduction methods and amounts.

"This started out as a right-to-know campaign," says Sargent. "Now people are talking about the right-to-know more."—SHAWNA MOOS

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Prospecting for Drugs

Convincing rainforest communities that the rare plants growing on their land could be more valuable—for their medicinal properties—than the usual crops has been no easy task. Even if useful new compounds were to be discovered in these plants, the R&D and commercialization processes might take decades, and the communities would have no guarantee that they'd reap any rewards for their preservation efforts. For them, clearing the land to grow timber or graze cattle offers a more immediate source of revenue.

To remedy this situation, the National Cancer Institute (NCI) and several other organizations with a vital interest in discovering new drugs are introducing incentives. Host countries would be compensated not only for preserving the diversity of plant species but also for actively participating in the search for new drugs.

Though the potential value of rainforest plants as medicinal agents has long been understood, it is only during the last decade or so, as the rainforests began shrinking at an accelerating rate, that organizations such as NCI have launched full-scale explorations for new drugs. Since 1986, NCI has awarded contracts totaling \$6.4 million to the Missouri Botanical Garden, the New York Botanical Garden, and the University of Illinois at Chicago to collect

plants in the rainforests of 25 countries in Africa, Central and South America, and Southeast Asia.

To help ensure that a country is adequately compensated if a promising anticancer drug is found in its forest, NCI contractors must collaborate with local organizations and scientists in searching for new compounds. Samples of specimens of every

organism collected in a particular country are donated to the national herbarium or repository. Test results are provided to contractors for distribution to scientists in the country from which the specimens are collected. And while the patent of a drug found under the auspices of the NCI remains with the U.S. government, residents of the host country may be included as codiscoverers if they make important contributions.

The NCI also offers programs to train host-country scientists in its headquarters

in Washington, D.C. Scientists from such countries as Zimbabwe, the Philippines, Tanzania, China, and Korea spend six months to a year working with chemists at NCI headquarters to learn how to isolate active compounds from plants.

Finally, NCI signs a letter of intent with the host country stating that if a compound is licensed to a pharmaceutical company for production, the institute will ensure that the country receives a percentage of any sales.

NCI views these arrangements as a



In the Belize rainforest, Kekchi Indians versed in traditional bealing help Michael J. Balick (center) of the New York Botanical Garden collect plants in a National Cancer Institute-sponsored search for medicinal compounds.

low-risk investment with the potential for a huge payback. At least 25 percent of today's drugs contain one or more compounds derived from plants, giving plants an estimated value of some \$63 billion in the world pharmaceutical market.

Still, the search for new drugs is a painstaking operation. Over the past three years, NCI's contractors have screened some 14,000 extracts from plant roots, leaves, stems, and flowers for potential AIDS drugs and 8,000 extracts for potential cancer drugs. "We need to screen an average of 50,000 plants before finding a compound that will be effective against AIDS or cancer," estimates Gordon M. Cragg, chief of NCI's Natural Products Branch, "and about 10,000 before finding compounds effective against

other diseases." Once a compound is discovered, moreover, it may take several more years before a commercial drug is developed.

Despite this seemingly daunting task, Cragg remains optimistic, pointing out that the odds of finding new compounds will improve now that the screening process has accelerated. "Developing the original screening techniques for AIDS and cancer drugs was what took the most research and time," he says. "Now the process will go much faster." By the end of the year about 50,000 extracts will have been tested, he predicts.

Other organizations are following NCI's lead. Merck, the largest U.S. pharmaceutical company, recently signed a contract with Costa Rica's National Institute of Biodiversity. In exchange for

collecting samples from the country's rainforests, Merck will give the institute \$500,000 per year for two years plus royalties for every new compound it discovers.

Such efforts have provoked interest among several other major organizations. The National Institutes of Health, the National Science Foundation, and the U.S. Agency for International Development will collaborate for the first time on a five-year project to preserve the rainforests by investing in their sustainable development. The agencies will accept proposals and award grants to select institutions as well as draw up cooperative agreements like those established by NCI. The program has an estimated budget of \$7.5 million and is scheduled to start in 1993.

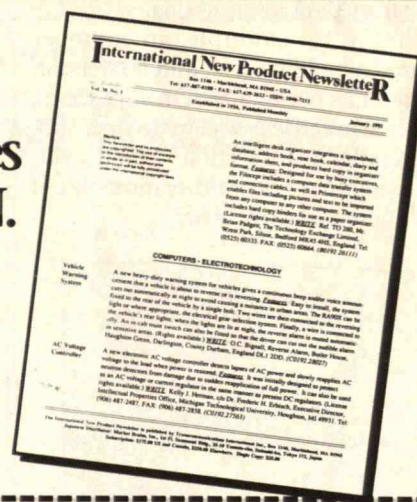
—NIRA WORCMAN

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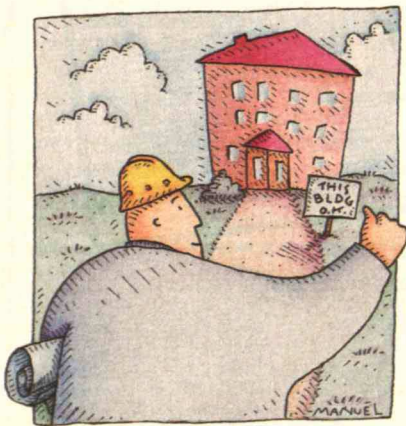
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Good Samaritan Engineers

When Hurricane Hugo tore up the South Carolina coast in September 1989, it killed more than 500 people and caused billions of dollars worth of damage to roads, bridges, and buildings. Before insurance adjusters could assess the damage and repair workers could begin the clean-up effort, however, they had to be certain that the buildings they entered were safe.

Unfortunately, although South Carolina, like most states, employs its own inspectors, the storm presented more emergencies than the state team could handle. Local engineers therefore decided to pitch in and volunteer their services. But they soon realized, says Joseph Jones, executive director of the South Carolina Society of Professional Engineers, that they had no legal protection if something went wrong.

What if, for example, an engineer declared a building safe, and it later collapsed on its occupants? Or, says Jones, what if an electrical system became submerged after an inspection? Could a volunteer engineer be held responsible if someone was electrocuted?



The engineers took their case to the governor, who eventually made them temporary state employees so that the state's insurance would cover them against liability. "It was probably two days before we got in there," says Jones.

"We had to wait for them to figure out how to protect us and then set up the mechanism to do it."

In a natural disaster, two days can be an eternity. Wouldn't it be better, thought Jones and his group of 100 volunteer engineers, if the state could adopt a law exempting volunteer engineers from liability? In fact, some states are starting to do just that. Six states have enacted "Good Samaritan" laws to protect engineers who attend to buildings, roads, and bridges in the same way that all 50 states have laws to safeguard doctors and nurses who help the injured at the scene of an accident.

The oldest law protecting engineers is in California, where those who perform structural inspections after earthquakes have long been shielded from lawsuits. Tennessee, Utah, and Virginia have passed similar laws within the last year. Connecticut and Missouri protect engineers by having them sign up at emergency volunteer registries. Anyone who's registered is covered. But elsewhere engineers may be vulnerable. "To my knowledge, no engineers have been sued yet," says John Gregorits, chair of the legislative and government affairs committee of the National Society of Professional Engineers (NSPE). "But in today's litigious society, that may only be a matter of time."

To help keep its members out of the courtroom, NSPE earlier this year drafted a model "Good Samaritan" law. This would protect licensed professional engineers who volunteer their services from liability for personal injury, wrongful death, property damage, and other losses caused by their errors, acts, or omissions. The act would apply to services performed within 90 days of a declared local, state, or national emergency. The Virginia law is modeled after this proposed legislation, and New Jersey is considering following suit. But when Jones proposed a version of the NSPE bill earlier this year in South Carolina—where hurricanes are an annual threat—he watched it die in the legislature's judiciary committee.

"It was a totally redundant piece of

legislation," says Paul Gibson, editor-elect at the South Carolina Trial Lawyers Association. Those who volunteer for charitable groups like the Red Cross have been covered since 1984 under the state's comprehensive volunteer and charitable immunity act, he



says, and the state's Tort Claims Act covers liability for those who volunteer for government agencies. As long as engineers work for a recognized organization, says Gibson, they're already shielded from lawsuits.

But Jones counters that engineers wouldn't think to volunteer for such charitable organizations as the Red Cross, which they assume deal more with health-related aid. And while they would happily work for governmental agencies, they have found, as in the case of Hurricane Hugo, that bureaucratic red tape can critically delay the process.

Thus a Good Samaritan law would be the simplest solution, says Jones, who is compiling data to argue these points when he reintroduces the bill at the start of next year's legislative session. He has also enlisted the support of architects, who may face similar liability.

Gregorits and others at NSPE agree that Good Samaritan laws are worth fighting for. If engineers are more willing to serve in times of emergency, the public will get qualified help faster, he says. "It's a win-win situation."

—DEBRA ROSENBERG

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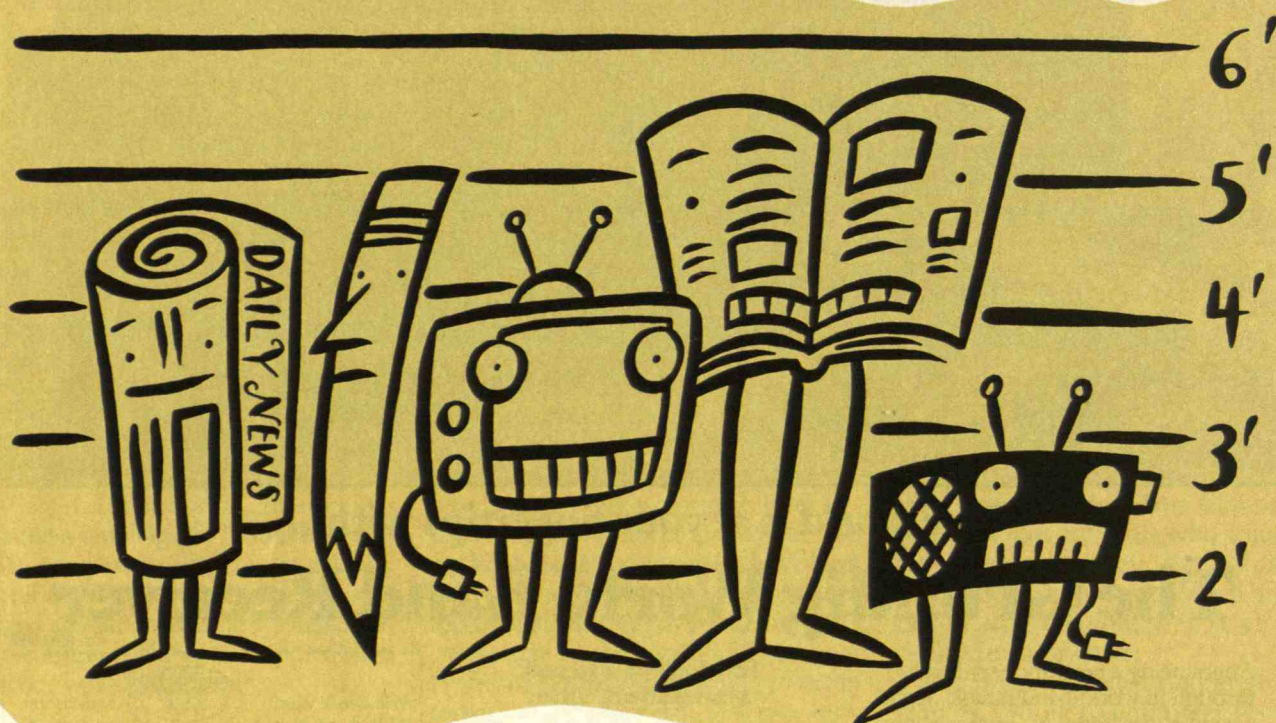
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Confronting the Bad News Bearers



SCIENCE reporters, like all other journalists, must serve the public by offering timely, informative, and useful stories. And like their colleagues covering more conventional beats, they must be aggressive in ferreting out such stories while not alienating their sources.

But those sources—scientists, engineers, medical practitioners, among others—are an exacting lot, often averse to the public airing of uncertainty and controversy, and generally not so desirous of media attention.

Add to this the frequent complexity of the subjects that science journalists must

report on, and it's not hard to see that even when they satisfy their readers, viewers, or listeners, they must endure at the other end the complaints, often appropriate, of a crowd that is tough to please.

Venturing into the belly of the beast, five leading science journalists participated in a panel discussion of their trade last June for an audience consisting largely of science and technology professionals.

Sponsored by MIT's class of 1947 as part of its 45th reunion, the panel consisted of **Paula S. Apsell**, director of the science unit at WGBH-TV in Boston

and executive producer of *Nova*; **Nils Bruzelius**, the editor responsible for science, technology, and health coverage at the *Boston Globe*; **Stuart Diamond**, Pulitzer Prize-winning former science reporter for the *New York Times* and *Newsday*; and **Ellen Ruppel Shell**, an author and codirector of Boston University's Program in Science Journalism. **Steven J. Marcus**, editor of *Technology Review*, served as moderator.

The panelists opened the session—entitled “Science, Technology, and the Media”—with brief statements, then fielded questions from the audience. An edited transcript follows.

Do science journalists do justice to science? Five members of the press face their accusers.

STEVEN J. MARCUS: I've taught science journalism to MIT undergraduates—aspiring engineers and scientists, mostly, who hoped to write occasionally for the general public—and it was always hard to get across the notion of “thinking journalistically.” When I gave students their first assignments—short pieces intended for publication—I'd often get what I called encyclopedic treatments: collections of facts, or citations of data, with little or no context. My favorite example was a nicely written 500-word description of how to make stainless steel. It was a lovely little exercise, but it didn't mention a person or a place or what was new about stainless steel. Had someone come up with a way of making stainless steel at a lower cost, with less energy, or with fewer polluting byproducts? Was there some important competition between research teams, each of which had a different approach to producing the material? In other words, what had happened? What was the purpose of reading this piece?

There's a lot more to the term “journalistic” than giving something a clear and coherent description. First you need a context for the general reader: there has to be a “story.” And it seems to me that a story has to entail a “process”—not literally the process, in the above case, of making stainless steel, but the process, say, of research and development, the process of converting knowledge into something practical. And in talking about such processes, you're not only discussing things but also people—the human players in the human institutions that comprise the science and technology community.

Without that process, if a newspaper or magazine were to run a manuscript such as my student's piece on stainless steel, it would be in the spirit of “read this, it's good for you.” But there are many things in the world that are good for us, and there has to be a reason why we'll read about one and not another.

Now most of the stories that journalists have to deal with are not very obvious. Surely the major disasters of our time—Chernobyl, Bhopal, the continuing AIDS tragedy—are stories; in fact, they are universes of stories. But

journalists and the public must be mindful not only of catastrophes but of routine situations. It doesn't take a genius to recognize a *Challenger* disaster, but the less-than-catastrophic events—the chronic, subtle, and not-so-obvious issues—usually have greater cumulative impact.

I'm referring not only to problems but to positive things as well. We have to distinguish the breakthroughs—dramatic events that happen rarely—from the incremental improvements that are happening all the time. These workaday kinds of occurrences are the stuff of process in science and technology. And the general public—basically an intelligent audience—is willing to read about, watch, or listen to coverage of this kind of process. But journalists, as well as scientists and technologists, must each do the right thing. Writers, editors, and producers must work very hard to convey to their audiences the nature of science and technology as it *is*—as it's done. They can't succeed, however, without the availability, cooperation, and patience of scientists and technologists.

A Partial Flowering

NILS BRUZELIUS: It used to be that science writing at most newspapers, even the largest ones, was the domain of a handful of interested reporters. Having been given what was then an ill-defined beat, they had to figure out—in a fairly lonely way—first what they ought to be writing about, and then try to convince their editors, who were responsible for the whole panoply of what newspapers cover, that what they had was important and worthy of competing for page one.

What we've seen in the last 15 years or so has been an enormous expansion from that humble beginning, probably attributable in part to the space program, in part to the enormous interest in biomedical science, and in part to the gradual recognition that science and technology were so influential in world affairs that no responsible news organization could avoid reporting on them, as difficult as that sometimes seemed to be.

So what began to happen in the 1970s was that a number of newspapers, led, not surprisingly, by the *New York Times*, began to explore ways to institutionalize science coverage. That's when the first science sections began, followed by a flowering in the early 1980s to the point that about 80 or 90 newspapers in the country have now developed weekly sections that serve as a base for the paper's science, technology, and health coverage.



BRUZELIUS:

If you want to see steam rise out of the ears of reporters or editors, hit them with the tired phrase "You're only doing this story to sell papers."

Of course, "flowering" is a relative term; there are some 2,000 daily newspapers in the United States. So we're not talking about something that has pervaded the entire industry. And in the economy of the last few years, some of the new science sections have fallen by the wayside. But most have held on, and I believe that with an economic upturn we'll see the number of them continue to grow.

These sections have helped increase the ranks of those who cover science—although there are still not enough—and provide them with a base within newspapers. When I was a science reporter, I had to ferret out the story of the day or the week on my own, having the benefit of consultation with at most one or two colleagues. At the *Globe*, we now have nine reporters covering the gamut of science subjects, and they have the opportunity to consult with two or three editors who not only are deeply interested in what those reporters do but who also serve as advocates for their stories at the paper's higher echelons.

That brings me to the subject of competition, which operates both internally—every day, editors must decide among themselves which subjects their papers will

cover—and externally. Virtually all news organizations feel themselves to be in intense competition with one another, but this operates in ways that may not be obvious to the reader.

At the *Boston Globe*, for instance, we compete with the *New York Times*. It's not that we think most readers scrutinize both the *Times* and the *Globe* each day and compare how they covered a particular story; it's simply a matter of professional pride—a way of assessing whether we're doing what we ought to be doing. When the *Times* or the *Washington Post* or the *LA Times* has done a story that we were totally unaware of or that we may have undervalued, we ask ourselves if we failed to understand the importance of the subject, or if we simply overlooked an interesting story, or whether we were right and the other papers were barking up the wrong tree.

There's one way in which competition doesn't operate, though. If you want to see steam rise out of the ears of reporters or editors, hit them with the tired phrase "You're only doing this story to sell papers." Certainly it's obvious that if we indeed don't sell papers over time, I won't have a job. But the fact is that most reporters and editors aren't in this business to go out and make their papers rich. In actuality, journalists tend to be an unusually idealistic lot. And the above characterization is very far off the mark on what makes reporters go after a story.

But competition does operate internally in the paper. Science journalists *do* have to convince senior editors that their stories will compete with whatever the White House has done that day, or what has happened in Eastern Europe or East Boston. Will the story be interesting enough and readable enough to work on page one or at some other prominent place in the paper?

Of course, one of the great benefits of science sections in daily newspapers has been that they enable us to offer readers some of the stories that really do deserve to be printed but that don't compete well on page one. In that sense, they have enormously broadened the range of material that newspapers can attempt to cover.

Stories Through Pictures

PAULA S. APSELL: Science on television is very much the orphan child. There's no legacy of science on television in this country, whereas in England at the BBC, and among other European broadcasters, management has been enthusiastic about science for years.

In the United States, *Nova* was for a long time the only science program on television. Commercial broadcasters simply considered science a complete impossibility—that the audience would just not buy into it. They were willing to gamble with health and medical programming because of its personal angle—after all, people were interested in their own health—but commercial broadcasters were afraid of science. Even in public television, which has long supported *Nova* and other science series, funding is always a struggle.

Meanwhile, the audience really likes science programs. That's proven by our ratings, which are among the highest on public television; *Nova* is the second-highest-rated series of the Public Broadcasting System. But when most PBS broadcasting managers look at the ratings, there's a kind of cognitive dissonance—they think it's all a fluke, an anomaly. And with the recent congressional assault on PBS in general—the network is having to defend its very existence—the position of science has become ever more tenuous.

Still, there are some hopeful signs. There is more science on commercial television in general, and it plays leading roles on the Discovery Channel and the Learning Channel, both of which I consider tremendous assets. The fact that the Discovery Channel can be successful as a commercial enterprise is a real demonstration, I think, of the public taste for science and technology programming. It shows that you can make intelligent programs for thoughtful people, and that they will watch them.

Science that you see on the networks, by contrast, mostly involves “breakthrough” reporting on the evening news, a two- or three-minute story giving just the results with no context. There's either no sense whatsoever that experts may disagree; or, if that sense is conveyed, it amounts to “this guy says this and that guy says that.” In either case, it's very hard for the average viewer to understand what's really going on.

Sometimes the facts are downright wrong. And I think that's not because television reporters are stupid or that they don't care, but

because science reporting just takes a little bit more time. You need to do substantial research before you even dare talk to your scientist sources. If you walk in there and have no idea what they're talking about—if you obviously haven't done your homework—they are not going to give you their best. I have personally found scientists to be very cooperative as subjects, but they don't suffer fools gladly. In some sense, you have to earn your stripes.

Whether commercial or public, television is quite inadequate for some things. It's not good, for example, at presenting abstract ideas. We're constantly amazed by how little we can actually say, even when we have a lot of time to work with. Our rule of thumb at *Nova* is to limit ourselves to three difficult concepts in an hour. That's because television is less a communicator of ideas than it is a teller of stories through pictures. On television, the narrative that's expressing the ideas is the subtext; the pictures are the real text.

Still, television does some things very well, especially in reporting on science. Many scientific concepts are, of course, highly visual. Scientists want to see the unseen, or view the world in a different way, just as we in television do. So the imaging and visualizing capacity of science is compatible with the strength of television. We can explain difficult scientific ideas using graphics and animation—made ever more sophisticated and beautiful through computers.

Television is also very good at showing people. That small screen is *not* so good for big wide shots of beautiful scenery, but it can show the human face. And, if you have a person who is a vibrant and passionate speaker, he or she can just galvanize the television screen. You've heard about the much maligned “talking heads” (filmmakers also call it “lip flap”). But when you have a really good storyteller—and when, as is often the case in science, there is a really good story to tell—the medium can be powerful not only in showing the drama of science but also that it is, after all, a thoroughly human enterprise.

Building Relationships

STUART DIAMOND: About three days after the accident at Three Mile Island, the wire services carried a story about a potential gas bubble that could have allegedly blown the damaged reactor apart and spewed its contents over the countryside. About an hour after that

disclosure, I had a chemist on the phone who had calculated that a bubble could *not* explode. I was ready to write that story for the next day's paper, but the chemist told me that he could not talk to me on the record; he needed to go through company channels.

It took two and a half days for that information to come out. During that time 144,000 people fled the area around Three Mile Island, and the failures of nuclear technology became emblazoned in the public's mind.

Technologists fail to respond to reporters quickly enough—not only in crises, but every day—with clear and correct information. My experience is that by the time many people in technical organizations are ready to respond, the public is no longer interested. And when the facts are finally made available, clarity is often not what it should be. After Three Mile Island, the National Association of English Teachers gave its Doublespeak Award to the nuclear industry. The winning entry was “energetic disassembly” for explosion. The runner-up was “controlled purging to the environment” for release of radioactive gases.

People who communicate information quickly and clearly—that is, people who don't feel they have to justify their entire existence or fight old battles every time they are asked a question—are valued by reporters and get their views into the paper and on TV more often.

Experts also need to communicate uncertainty—what is known, what is not known. They must be willing to communicate the process of science and not just the results, because it's the process that enables the real education of the public. The failure to reveal the process is what keeps people from understanding technology and prompts them to be suspicious of it. The way we got to the moon is more interesting than the fact that we got there.

Similarly, one should never hide bad news about technology. People will find out sooner or later, your company will be tagged with a cover-up, and it could affect you for decades. There's often a pull between public-relations people, who want to disclose the events, and lawyers, who'd prefer to reveal as little as possible because of fear of liability. But the same people who are on a jury two years later will likely have read the paper containing the bad news. They'll have in their brains an image of an organization that doesn't disclose things. Thus companies should make technical people available during breaking-news events and not

hide them behind spokespersons.

In other words, it's very important not to leave an information vacuum. The day of the Bhopal accident, my editors at the *New York Times* sent me to Institute, West Virginia, where Union Carbide had a facility similar to the one in India. My assignment was to get a tour of the plant and write a story based on whatever Union Carbide had to say. I talked to the people in the press office up in Danbury, Connecticut, where the company is headquartered, and they were agreeable. So I went down there with a photographer, but by the time we got to the plant gate, company officials had changed their minds. They told us we couldn't come in, and in fact threatened to have our photographer arrested for taking pictures across the street on a public highway.

Having a lot of time on my hands, I interviewed people at the area's Seven Elevens and other locations. And when many of them said they were terribly worried about the dangers of cancer, it occurred to me that there was another story here—“Jobs versus Cancer in a Chemical Valley.” So I called up Union Carbide the next morning and said, “The *New York Times* wants a story on page one for tomorrow's paper, and I don't care what that story is as long as it's a good one. There are two possibilities: a tour of your plant, in which you tell me how the plant works and what you'd like for me to say; and ‘Jobs versus Cancer in a Chemical Valley.’ You pick.”

They picked the second story. They simply would not give us a tour of the plant. We eventually did get one, six months later, but only after the paper ran a devastating series from Bhopal that showed numerous violations of procedures. After we finally were able to run a story about the Institute plant—which the company loved, by the way—I reminded them that they could have had it six months before and avoided a good deal of public ill will.

Consider, by contrast, Johnson & Johnson's reaction after the Tylenol scare. Its quick response was literally worth billions of dollars. Lessons include having a crisis plan, having background material long before a news event, and making sure that reporters have all your phone numbers. Because I covered nuclear issues for years, I used to have not just the office numbers of Ralph Nader's people but their home numbers, weekend numbers, car-phone numbers, and beeper numbers. I was always able to reach them in a pinch. But for many of the institutions I had to deal with, all I

could get was the the main "00" number of the switchboard.

Brookhaven National Laboratory on Long Island was an exception; its people understood the importance of building relationships with the media long before an actual news event. One evening there was an accident on the Long Island Expressway—a truck carrying a nuclear-waste cask from the laboratory's reactor had overturned while en route to a disposal site. The cask was thrown from the truck but it wasn't breached. The laboratory called me and the police at the same time, and explained exactly what had happened. *Newsday* ran a brief item on page 93—a picture with a little caption. Had I not had a relationship with the laboratory, or had they stonewalled us, there probably would have been a major story on page one.

What does that mean? It means reporters develop sources. They trust the ones with a good track record. It means if you're a good source, reporters go out of their way for you when you want something in the paper.

Let's face it, not all news gets in the paper every day. I used to get 100 letters a day, and 25 to 50 phone calls. There's a tremendous gray area, and reporters worry about being used by people who release half-information at 6:00 p.m., right at deadline when it's hard to verify. So I justified trying hard to get my sources' stories in the paper because they provided good information, on deadline, for major stories when I needed it—and when the public benefited by having more complete and accurate information.

Thinkers and Analysts

ELLEN RUPPEL SHELL: As a quasi-academic I have the luxury of being what we call in this business a "thumb sucker." Freed from the pressure of daily or even weekly deadlines, I can pull back and ruminate on the role of science journalists in society. There are two common notions about science journalists: that they should be spokespeople for science, and that they should be objective reporters of science. But to my mind, neither of these views is adequate or even appropriate.

Many people, particularly scientists, believe

that the job of the science journalist is to be a mouthpiece—to bring the thinking and deeds of scientists down to the common people, much as Prometheus brought fire from the Gods. But as you may recall, Prometheus was eventually rewarded for his efforts by being tethered to a mountain and having his liver eaten by an eagle.

Journalists who uncritically put forward the work of scientists, though not likely to meet



APSELL:

I have personally found scientists to be very cooperative as subjects, but they don't suffer fools gladly. In some sense, you have to earn your stripes.

such a dramatic fate, are also in peril—of misleading the public. For despite the impressive intellects and credentials of scientists, and despite the persuasiveness of their data and their arguments, we have all learned from painful experience that even some of the most widely held and applauded theories have, in time, turned out to be incorrect.

Scientific progress is secured only rarely by gestalt. More commonly, it is the result of a dialectic—a continually evolving process whereby even the work of less highly regarded scientists, researchers who may at first be considered gadflies, can significantly contribute to the ultimate store of knowledge.

Until recently, for example, Darwinian theory was the bible of evolution, and those who argued otherwise were often not taken seriously, even ridiculed. Today, variations on Darwin's views have been incorporated into the body of thinking. A science journalist who simply took the Darwinian view as gospel, who had ignored those who critiqued it, was simply not doing the job.

So it does science and the public no service for science journalists to cover a subject without first ferreting out alternative views, as

painful as that process often feels to scientists and engineers. It is the job of the public-relations professional, not the journalist, to unquestionably promote science. And that's a distinction that, as a science journalist, I find that I often have to make when I speak with scientists. When I hear an interesting point of view and ask for the names of critics, scientists often say, "What is this, the *National Enquirer*? We don't want to sensationalize the

view so that they can make up their own minds. And that's a pretty big distinction from providing "the answer."

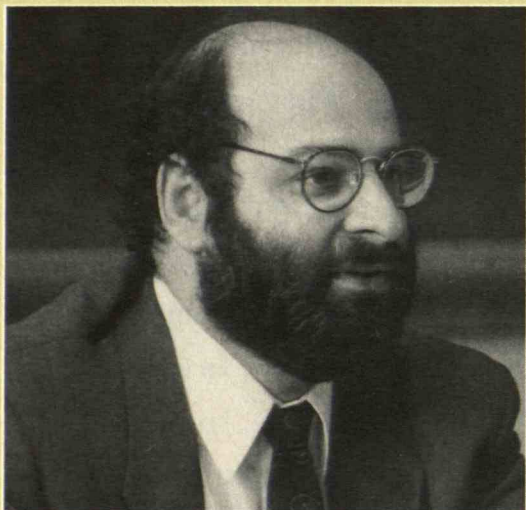
Science journalists are not stenographers. Their responsibility is not to the scientist, but to the public. And only by being serious thinkers and analysts will that responsibility be fulfilled.

Not by Expertise Alone

QUESTIONER: I have been chairman of the board of an acute-care hospital, and I know that the modern tools we now have to work with add greatly to the cost of medical care. But when I read an article about how much these technologies have increased costs, I never see any estimate of the benefits. When I read a story about baseball, and they discuss a pitcher, they tell you his won/lost record. So why not establish similar indices for medicine? Why not report how much of that cost is offset by an increase in life expectancy?

BRUZELIUS: One difficulty in doing that—and we try—is resistance from the profession. When we look at fancy new technologies like PET [positron emission tomography] scanners or MRIs [magnetic resonance imagers] and ask "What does that investment really buy us?" we have a hard time getting good specific answers. In some cases, that's because the technology is too new; in others, it's probably because the answer in fact is that the incremental gain is very small. Increased life expectancy in this country has much more to do with improved sanitation and antibiotics than it does with almost any technology you can name.

SHELL: Some countries, like Canada and England, deal with these kinds of cost/benefit challenges by rationing their health care appropriations—by limiting the number, and thus increasing the use, of high-tech devices and other kinds of services. Recently, C. Everett Koop said on television that he would never want to see such a system in the United States because people sometimes have to wait a long time for care. I've gone to Canada and England, as have other U.S. journalists, to observe those systems, and they are quite effective. The



DIAMOND:

Experts need to communicate the process of science and not just the results, because it's the process that enables the real education of the public.

story. Listen to me. If you take notes carefully, you'll know what the truth is."

I've also heard complaints from scientists that a reporter with whom they've dealt is not objective. But what is it that these scientists are actually suggesting? If they are asking simply that the reporter be fair, that's certainly a reasonable request. But very often they're essentially asking that the reporter have no views. Even if we overlook the impossibility that a human being could remain objective on an issue about which he or she feels strongly enough to investigate, neither science nor the public is served if science journalists aspire to this saintly frame of mind.

The job of science journalists, and of all journalists, is to listen to as many views on an issue as possible. It is also their job to report these views. But to my mind, the ultimate and most important job of science journalists is analysis. They must break down and look at the information and range of opinions, integrate them with what they already know, and provide their audience with a coherent and informed impression. In other words, science journalists have to give readers or viewers enough information and enough points of

Canadians and the British are by and large very happy with their health care systems. It would have been nice if an informed science journalist had been on hand to interrogate Dr. Koop, but instead his unquestioned statement on national television simply solidified the public impression that none of us in this democratic country should ever have to bear the thought of waiting for anything.

APSELL: The *New York Times* last year ran a series of articles in just that spirit; it compared the U.S. health care system with that of the British, the Germans, and the Canadians in a detailed and extremely informative way. In fact, those articles made us at *Nova* rethink what we'd do on the subject. What we ultimately decided is to document the experience in Oregon over the next two years. If it gets its federal waiver [from Medicaid requirements], Oregon will be the first state in the nation to implement a real rationing program. This is the kind of situation where you hope you can simply present the actual experience of the people involved and let viewers draw their own conclusions. That's because you're dealing with an issue in which there isn't necessarily a right and a wrong; it all depends on your values.

QUESTIONER: I'm appalled at how poor the reporting has been on so many of the major technological events. At the time of Chernobyl, for example, I read that 10 to 20 thousand people could die. Where was such misinformation coming from? Similarly, there were some real problems in the reporting on cold fusion and on whether the Patriot system was effective in the Persian Gulf. How can scientists and engineers give the media what the media so clearly need from us? Can we establish "hotlines" such as the one Mr. Diamond seemed to have had with Ralph Nader's people?

DIAMOND: Often the scientists and engineers who have the best information either are not known to the press or are not available when they need to be. Another problem is that there's too much noise. Too many people who have access to reporters provide them with information of low quality. And a related problem—one that occurred after Chernobyl—is overstatement by people trying to manage public perception. For example, representatives of the nuclear industry maintained

that whatever happened in the Soviet Union had absolutely no relationship to anything that might conceivably happen in the United States, while officials from the U.S. Nuclear Regulatory Commission were saying that this assertion was simply not true. So it's important to get the names of technically competent—and available—sources into the hands of reporters before a news event happens.

MARCUS: Reporters at the country's elite newspapers have usually been in the business long enough to have learned how to be resourceful under very tight deadlines. Also, their papers have great prestige; when they telephone someone, he or she takes the call or returns it pronto. And if you're reaching the wrong person, you can move on to the right one fairly quickly. But to help everyone, an organization in New York has established a "hotline"—actually, a computerized database. The Scientists' Institute for Public Information started this Media Resource Service about a dozen years ago to match expert sources who have previously agreed to be interviewed with journalists who need them. I've used this service a few times, and while it's not a panacea, I found it very useful and convenient.

BRUZELIUS: There's a limit to what an expert can provide, though. The questioner's remarks seemed to suggest that there are always right answers, even under the complex circumstances he cited. But journalists often have to deal with issues where "the answer" isn't known yet. Often the allegations of irresponsible press coverage reflect scientists' discomfort with addressing uncertainty—with examining contentious points of view based on incomplete information—and with the ensuing public debate. When no one has the whole story, then it strikes me that the press is in fact doing its job when it brings that out, even if the result is less than perfect.

QUESTIONER: But global warming, for example, is treated as an accomplished fact in the press when it's really an alleged fact. Alar was too quickly labeled a deadly poison. I worry that the press gives too much publicity to people who spend little time on research and lots of time on projecting a point of view.

BRUZELIUS: The Alar story is a good example of the complaint you're raising. It got out very quickly, and the facts had a hard time catching

up. On global warming, my sense is that most stories on the subject make the point that it's still far from a proven case. The perception that it's indisputable tends to result from the secondary stories; in looking for shorthand ways to refer to something, qualifiers often get dropped.

SHELL: The press isn't perfect, and we tend to make our mistakes publicly—by definition. And no matter how occasional they are, when the press makes a mistake, it is front page news. But I think we're improving. Over the last 30 years, science journalists have made great strides. More and more newspapers, magazines, and television and radio outlets are looking for journalists who have formal science backgrounds or who at least have followed science systematically for several years. Thus I think that fewer and fewer of these oversights or mistakes will get made. Just the fact that we're hearkening back to Alar, which is quite an old story now, gives me faith that things are really improving.

APSELL: I have to take issue with my colleagues here. I'm a little surprised that there's no acknowledgement here of some of journalism's more insidious processes. A lot of science journalism, both in print and on television, is simply awful. Also, reporters do not like to write stories that say the status quo is fine or that the establishment is right. They're boring. I want an angle when I do a story, and very often that angle is controversy. That's what gets the stories on television or into the paper. I absolutely admit to you that when I'm giving a producer authority to go ahead and do a program, the major factor that I think about is whether the program is going to attract a large audience. I hate to say this because I work for public television and it wasn't always the case. But that's the reality of my profession. Still, it's nothing to be ashamed of, and we really ought to more readily acknowledge these pressures, which will only get worse, not better, as the economy gets more sluggish.

SHELL: I think we're making progress, though, Paula. A few years ago I was following the ozone-depletion issue, and I wrote two major articles, for different magazines, with the conclusion that we really didn't know what was happening. That was alright with the magazines' editors, and the articles were published. When I finally did go down to Chile to re-

search a third article, researchers there were doing the definitive experiments and found the so-called smoking gun linking the presence of CFCs with ozone depletion. My editors and I of course went with that. But even then, we did so cautiously, and we included all the caveats. That kind of carefulness would have been highly unlikely 15 years ago.

To Print or Not to Print

QUESTIONER: What seems to sell papers is tragedy and disaster, but where is the *responsibility*? Take asbestos in our schools. The media report it right away as tragedy and disaster, so the authorities start removing asbestos from the schools. And then what happens? Oh, my goodness, tragedy and disaster, now asbestos is released into the air and is floating all over. Similarly, a person dies from inhaling asthma medication. It turns out later that she was using it eight times more frequently than what was prescribed. But in the meantime the media rush in, and the response of people who need that medication is to stop taking it. And the result is that there's suddenly a lot of deterioration among asthmatics. You may say that tragedy and disaster make for good "stories," and that this is a "reality of the profession," but where's the responsibility?

BRUZELIUS: The responsibility is indeed right here, and our record is certainly not perfect—there's a saying that rumor gets a mile down the road before truth gets its boots on. But usually the process of keeping some lid on things works pretty well. At the *Globe*, the asthma medication story was a brief item placed well inside the paper. We then came back to it a few weeks later—in a weekly personal-health column that runs in the science section—and did a balanced story on the subject. Misinterpretation is indeed a great concern to editors, one that we wrestle with every day.

DIAMOND: Let me just turn that question back to the questioner. You're the editor of a newspaper. It's four o'clock in the afternoon. You see on the wire-service machine that a woman has just died of asthma, seemingly from taking some medication. You can't reach the woman's family, can't reach her doctor. What is your decision?

QUESTIONER: My "decision" is that to run a

story on which I have no facts is very unprofessional.

DIAMOND: Oh, but you do have some facts. One is that someone has died of asthma; another is that the person was taking a particular medication for asthma. You also know that if the connection is true, and you don't put something in the paper, more people might die the next day from taking the same medication.

QUESTIONER: I also know that people have died from aspirin overdoses, from driving cars...

DIAMOND: But what's your decision? What do you do?

QUESTIONER: I wait a couple of days until I get good information.

DIAMOND: You have a hundred decisions like that to make every day. Do you run *any* stories?

QUESTIONER: That depends on the subject. Science stories often have much more uncertainty than, say, police blotter stuff. Science questions should be handled a little bit more carefully. If you want to sell papers, you've got things like car chases.

DIAMOND: Then what you're suggesting is that any science story about which there is uncertainty ought to be held for a couple of days. I'd say that's unworkable.

QUESTIONER: Not necessarily. If you've got information that reduces the uncertainty, you run it. But if you have no information, then you should hold off until more information is available.

SHELL: Most journalists are not asking "How do we sell papers? How can we make this hot? How can we be sensational?" They *are* asking "How can we get that information right now, for the next edition?" Maybe call the local hospital or the local authorities. Make as many calls as possible. Few editors will rip something controversial off the wire and stick it in the paper unexamined. They will try to tap their sources.

BRUZELIUS: Sometimes we can't obtain that

information so fast: the police aren't talking, the hospital isn't talking, the family isn't talking, their doctor isn't talking. We then have to decide whether we'll run a story acknowledging that the critical information isn't available or whether the story is not ready because we just can't achieve some minimum. It's a real balancing act: Do you pretend the event didn't happen? Or do you do the best job you can with the



SHELL:

Journalists' responsibility is not to scientists but to the public, and that responsibility can be fulfilled only if reporters are serious thinkers and analysts.

most information you can get and then keep working at it the next day, and the next?

QUESTIONER: I have an occasional problem with headlines...

BRUZELIUS: So do we.

QUESTIONER: ...that don't really tell the story of the article or that skew the whole sense of the article. What controls do you as reporters or editors have over these kinds of occurrences?

BRUZELIUS: In terms of stories that are running in the daily paper, I have very little control unless I choose to call up at 10:30 at night and ask to have a headline read to me, which I will do on occasion for a very sensitive story. The usual process is that when a science reporter writes a story, I or one of the other two science editors edit the story; it gets turned in sometime between 6:30 and 7:30. It then goes over to a separate group of editors at the "copy desk" who give it another read. And because they have little background on the reporting that went into the story, they're trying to look at it with the eyes of the next

day's reader. They examine it for what we call "the holes" as well as for any internal contradictions, and their final responsibility is to write the headline. It's a heck of a difficult job trying to capsule—sometimes in three, four, or five words—what a story of a thousand or two thousand words is all about. I don't envy them, and I sometimes wince at the headlines that I see on stories that I was responsible for. But that's for a *daily* story. In my weekly section, which is put together by Friday night for publication the following Monday, I have a lot of control—I write or approve every headline.

MARCUS: I'd note here that the person who writes the story should not be the person who writes the headline. It's too difficult to sit back and, as Nils says, see the story with the eyes of the reader. Even if a reporter comes up with a very clever headline, often it's only clever because of what he or she knows and the potential reader doesn't. Thus professional writers, when they submit manuscripts, usually don't even bother to put titles on them. When potential *Technology Review* authors (who are mostly not professional writers) ask "how about such-and-such as a title?" early on, I tell them we have to have a story first, then we can worry about the title. Finally, I'd note that the title or headline is not supposed to summarize the story, because that's usually not possible. It is supposed to "hook" readers—not unfairly or irresponsibly, but simply arouse their attention and at the same time give them some sense of what the story is about.

Ounces of Prevention

QUESTIONER: I have been interviewed several times, both in the United States and abroad, for television, radio, and newspapers. If I ever put my foot in my mouth on TV or radio, it's my fault. But when I give interviews to newspaper reporters, over half the time I find myself quoted incorrectly, sometimes with considerable embarrassment. As a result, I've asked reporters if I could see what they've written, or at least have it read to me, before it goes to press. But the answer is always the same: "There is no time for that. We have to go with it in *three minutes!*" Then the inevitable occurs, and my friends—or officers of my university—call me up and tell me what a fool I have made of myself. And that is not enjoyable.

DIAMOND: When such a mistake is made, you need to write a letter to the boss of the person who wrote the story. Most news organizations live by their credibility—people won't read, watch, or listen to them if they are perceived to be false much of the time. Send a calm, detailed letter identifying the mistake, setting out the facts, and then asking for a correction or some other kind of relief that you think is appropriate—a follow-up story, for example.

QUESTIONER: Which is then buried at the bottom of page 18.

DIAMOND: Not necessarily. A big mistake was made in the *New York Times* on Iran/Contra, for example, and the reporter had to write a page-one, six-column correction.

MARCUS: And just a few weeks ago, a similar retraction was made, also in the *Times* and on page one, regarding a biotechnology story—on "DNA fingerprinting." But I agree with you that once the mistake is made, even a prominent correction doesn't have quite the same impact. And I agree that the best strategy is to try to prevent the error in the first place. Only I wouldn't go as far as requesting to see the entire story—an individual source doesn't have that right. The source does have the right to hear what he or she has been quoted, paraphrased, or cited as saying. And there usually is time for that—in a typical newspaper story, you'll be quoted in no more than a sentence or two. So it's completely reasonable to request a call from the reporter after the story has been through most of the editorial rounds. It's a contract, of sorts, that averts the problem, at least where the story relates to you.

BRUZELIUS: Journalism has had a tradition of not only strong resistance to showing a news source the entire story, but even to reading back quotes. A lot of that came from political coverage, where once people heard what they had actually said, they wanted to take it back. But that resistance has largely evaporated among science journalists. It is certainly legitimate to request—or even to establish as a condition of the interview—that the reporter will later read back the part of the story that pertains to you. Many of the reporters who work for me often propose it, in fact.

SHELL: I agree that an ounce of prevention is always far superior to several tons of cure. And I also advise people, if they're feeling uncomfortable with a reporter for any reason, to suggest that the interview begin "off the record." That way, you can chat with the person for a while, explore the points likely to be covered, and then decide whether it's worth proceeding "on the record," or at all. That won't necessarily prevent some silly little mistake from happening—we all make them—but it will likely ensure that there are no substantive oversights. The process is helpful to journalists, too.

APSELL: It's also the responsibility of an individual journalist to make it clear to his or her editor what the time requirements of the story are. Some stories simply cannot be done in one day; there may not be enough time to get the facts.

QUESTIONER: It all sounds so informal, though, and ad hoc. I'd feel a lot more comfortable if you told me that newspapers, TV stations, and so on had well-defined systems of checks and balances.

MARCUS: They do. Any good publication, any decent media outlet, will have many kinds of checks and balances. And they often involve not just one pass through the hierarchy but numerous loops large and small. It's an iterative, back-and-

forth procedure, and the result should belie all that: the complexity of putting out the product should not be at all obvious. When you read a story in the daily paper, it should have the facts you'd wish, possess a nice rhythm, and overall be a darn good read. It should seem as if the editors plucked it off a tree. My rule of thumb is: the easier the read, the more you can be assured that many people sweated over it—asking questions, getting back to sources, editing the copy (repeatedly). It's a pain in the neck sometimes, but it's the only way to achieve quality. This also implies something of a commitment from sources as well. If experts tell reporters that they'll give them only 10 minutes of their valuable time and be bothered no more, they haven't likely done their share. It's a two-way street.

I would entreat you to put out of your heads the idea that "they sensationalized just to sell papers." Just as we spoke about journalists' need to reflect the "process" of science and technology, people need to realize that journalism is also a human process, executed by people who occasionally make mistakes. But the important thing is that they try not to. In these human institutions there are all kinds of human beings, and some have lower standards than others. So I can't guarantee that every journalist you'll ever meet has great integrity. But you can assume, if he or she works for a reputable organization, that there's a well-designed and well-maintained system of quality control at work. ■

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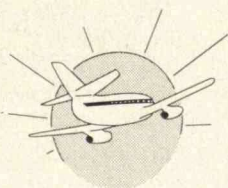
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April 24 - May 8



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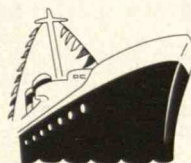
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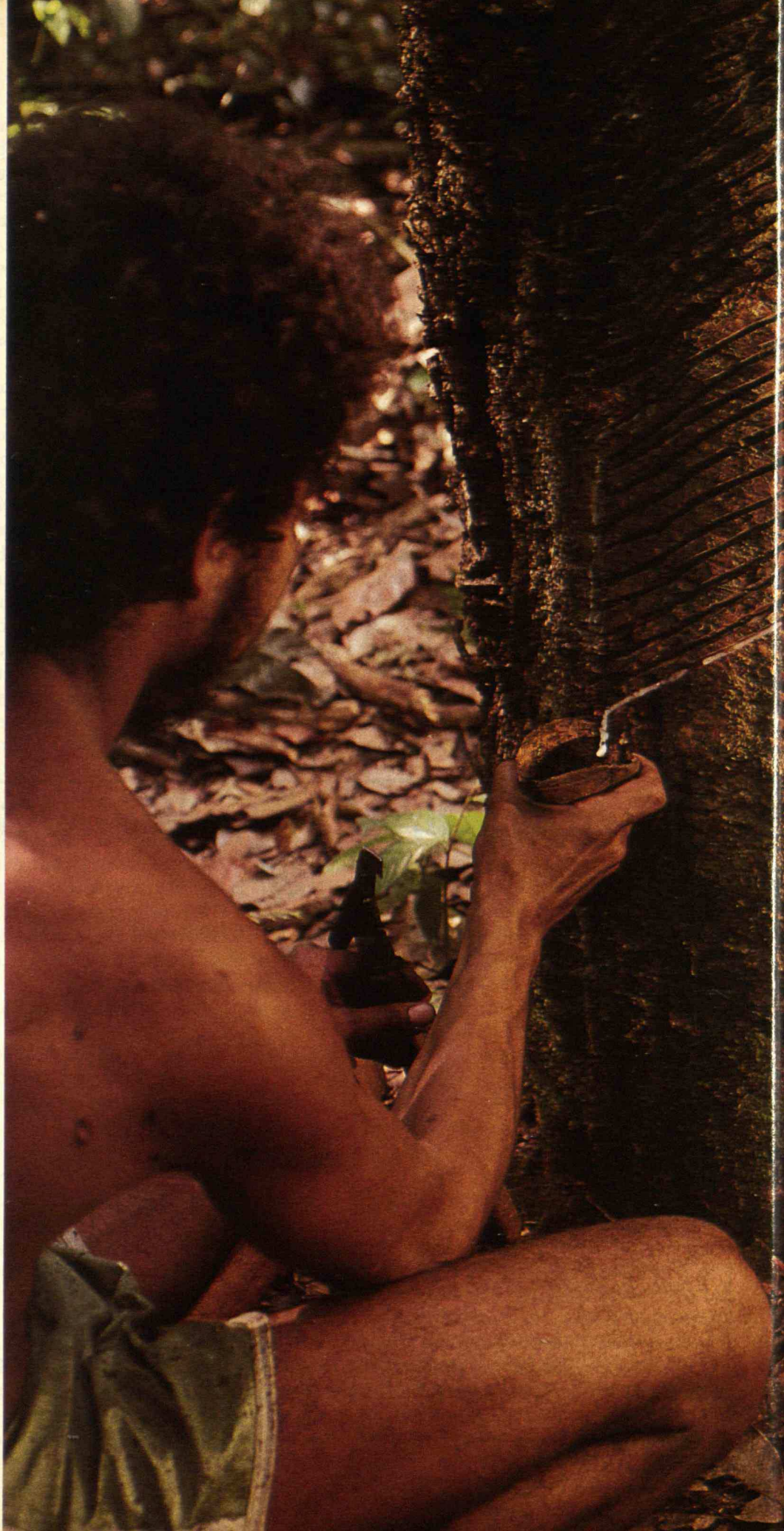
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Brazilian tappers cut a rubber tree to start the latex flowing, pour it into a bowl for smoking, and roll it for shipping. Environmental groups are working with rubber tappers to help protect their way of life—and the Amazon.





BY SANDRA HACKMAN

AFTER RIO

Our Forests, Ourselves

NONGOVERNMENTAL ORGANIZATIONS BOTH FOREIGN AND DOMESTIC ARE HELPING COUNTRIES SUCH AS BRAZIL LINK ENVIRONMENTAL AND SOCIAL ISSUES.

BRAZIL is a land of extremes. The most populous and largest nation in Latin America, it contains one-fifth of the planet's freshwater and its most extensive rainforest. The country's GNP grew at a yearly clip of 7 percent during the "miracle years" of the 1960s and '70s, and though that rate has slowed considerably, Brazil still boasts one of the largest economies in the developing world. Yet despite its abundant natural resources and considerable wealth, the nation's income distribution is among the world's most skewed. One-third of its people live in poverty while 4 percent of the population owns half the land. Millions of people live in squatter settlements on the outskirts of cities such as Rio de Janeiro, their numbers swelling daily as cattle ranchers, loggers, and miners encroach on the country's rural expanses and dispossess local inhabitants.

Brazil's willingness to host the U.N. Conference on Environment and Development (UNCED) in Rio this past June thus seems appropriate. Billed as the largest global meeting ever convened, the Earth Summit aimed to reconcile intensifying international pressure to protect the world's natural inheritance with a mandate to address the devastating poverty endemic to much of the Third World. Yet in its focus on long-term environmental questions, the conference failed to address the needs of people who must daily cope with degraded conditions that threaten their lives.

"UNCED avoided dealing with the pressing problems that we know already exist," says Jesse Ribot, professor of urban planning

at MIT. In cities such as São Paulo, for example, only 50 percent of the population has access to sewage systems, and much of the drinking water is contaminated. "Safe drinking water is the single biggest threat to public health worldwide," according to Jonathan Fox, MIT political science professor.

Participants in the Global Forum, a gathering in Rio of nongovernmental organizations (NGOs) of the North and South—or "haves" and "have nots"—attempted to address such questions during the summit. Negotiations at this parallel conference, which included international environmental and grass-roots groups alike, reflected a growing realization that even deforestation and other large-scale ecological threats affect the lives of local residents as much as the long-term health of the planet. "Deforestation needs to be stopped not only because of global warming but because people live in the forests and depend on them," says Ribot. "By not paying attention to people, we are undermining both people and trees."

The Amazon, where widespread burning has prompted much of the outcry over rainforest loss, is a case in point. "The Amazon is not a sanctuary but an inhabited area, home to 17 million people," says Antônio Rocha Magalhães, a former secretary of planning for the Brazilian state of Ceará. While "long-term climate change is the hook by which people from the North can focus on problems in the South, regional impacts from burning, including declining rainfall and rising temperatures, are more immediate and severe."

Recognizing this, Northern scientists and funders have joined rainforest residents in an innovative attempt to combine social benefits with environmental protection in the Brazilian Amazon. In areas called extractive reserves, these NGOs are forging a link between efforts to manage natural resources and alleviate poverty.

Sustainable Development in the Rainforest

In the reserves, the Brazilian government guarantees land rights to long-time residents of the forest such as rubber tappers and Indian tribes. The inspiration of Brazil's National Council of Rubber Tappers, which sought to protect the traditional way of life of people who harvest latex, the reserves aim to allow residents to live off the Amazon's bounty without destroying its ecological integrity. Before 1988, when the government created the first such region, the idea of establishing an inhabited conservation area had no legal precedent. Now 19 reserves—covering some 8.3 million acres—allow shared ownership of land among rubber tappers and Indians and restrict encroachment by cattle ranchers and squatter farmers. (President Fernando Collor de Mello announced the creation of the 5 newest reserves, some outside the rainforest, just before the summit.)

Convincing the government to establish the reserves—a significant achievement in a country that has long subsidized clearcutting and encouraged rainforest immigration—was a first step. The hard part—“setting up an infrastructure to make the idea work”—is now the focus of local inhabitants assisted by Northern funders, says José Roberto Borges, director of Brazilian programs for the Rainforest Action Network, based in San Francisco.

A 1 million-acre reserve in Acre, on the upper Juruá River, one of the major tributaries of the Amazon, is the site of many efforts to create a long-term infrastructure. Until 1987 the area was completely dominated by *seringalistas*, rubber barons who forced destitute migrants from the Northeast to work in the forest essentially as slaves. Today NGOs such as the Rainforest

Action Network and Cultural Survival, based in Cambridge, Mass., provide technical assistance and funding to the Union of Indian Nations and the National Council of Rubber Tappers, which manage the reserves and sell fruit pulp, nuts, and tropical oils to distributors. Cultural Survival requires buyers of rainforest products to share a percentage of their profits with native suppliers. And to bring more of the processing and thus the profits under local control, the organization has helped set up a

community-owned factory in Acre to shell Brazil nuts before they are shipped.

The income from such sales is being used to hire health workers, establish schools, monitor violence against rubber tappers and Indians by ranchers, and purchase cooperatively owned boats to ship supplies into the region and goods out. Digitizing maps of the Amazon is another important joint project mounted by Cultural Survival and CEGI, the country's largest human-rights group. Computers scanning the maps against Landsat photos can detect illegal incursions into the reserves in a matter of weeks or months, says Cultural Survival research director Jason Clay.

Northern groups such as Oxfam and the Ford Foundation have also helped support the Center for Indian

Research and Training, which combines schooling in Western biology and law with traditional techniques for sustainably harvesting the forest's trees, animals, and fruits. The National Council of Rubber Tappers and the Union of Indian Nations are now attempting to secure funding for a computer network that would link the groups' dispersed branches with environmental and human-rights organizations in Brazil and abroad.

Northern NGOs are also assisting residents of sensitive areas outside the reserves. In Mato Grosso, a savannah that is home to thousands of landless people, the Rainforest Action Network is funding small cooperatives of residents who make and sell adobe bricks as an alternative to cutting nearby forests for salable wood. In the northern state of Pará, landless peasants are collaborating with agronomists from the Gaia Foundation, established in England by former Brazilian environmental secretary José Lutzenberger, to develop high-yielding strains of native crops that thrive in marginal soils.

Rainforest residents aim to use such efforts to change the way both government and outsiders look at environ-



EXTRACTIVE RESERVES AIM TO ALLOW INHABITANTS TO LIVE OFF THE AMAZON'S BOUNTY WITHOUT DESTROYING ITS ECOLOGICAL INTEGRITY



With Northern assistance, Amazonian Indians have built a factory in an "extractive reserve" on Brazil's Jurúa River for shelling Brazil nuts before they are shipped. Some of the profits are used to buy cooperatively owned boats as well as to fund health care and construct schools.

BY NIRA BRONER WORCMAN

Local Groups Think Globally

WHILE the official Earth Summit plodded along at the far south end of Rio de Janeiro last June, allowing access only to those with the proper credentials, the alternative Global Forum sprawled over downtown Rio and opened its doors to both delegates and the public. More than 7,650 groups based in 165 countries registered for this conference of non-governmental organizations (NGOs), and all told some 250,000 people participated in its meetings, performances, and exhibitions.

One could listen to speeches by celebrities—including U.S. Senator Albert Gore and the Dalai Lama (exiled spiritual leader of Tibet)—or mingle with curious *cariocas* (Rio natives) trying to understand the meaning of the sudden worldwide concern with ecology. Diversity was the watchword as women, youth, indigenous people, people of color, various religious groups, industry, and others shared visions and concerns. Participants wandered among 650 booths and attended conferences on topics such as “Chinese and Holistic Medicine,” “The Public Schools’ Perspective on Environment Problems,” and “Regional Wildlife Programs in Developing Countries.” Whatever one’s pleasure—French theater companies, perhaps, or parades of street children—it could probably be found at the Global Forum, which

soon became the city’s main happening.

But if diversity was the forum’s great strength, it was also its weakness: the NGOs had even more trouble than the national delegations in coming to terms on treaties. “We had NGOs from regions with very few resources who were participating in such meetings for the first time, while others had in-depth knowledge of the issues,” says Maximo Kalaw, head of the Philippines’ Green Forum and co-chair of the Global Forum. “All of them wanted to be heard.”

The groups also arrived with different agendas. For example, “Northern NGOs specializing in species conservation had difficulty dealing with the complexities of development,” says Kalaw. Despite these stumbling blocks, the NGOs managed to produce more than 30 treaties dealing with everything from environmental education to alternative economic models.

These documents are “several steps ahead” of the treaties that emanated from the official conference, claims João Paulo Capobianco, executive director of SOS Mata Atlântica, Brazil’s largest environmental organization. For example, the treaty on climate change commits NGOs to work actively to reduce CO₂ emissions in developed countries by at least 25 percent from 1990 levels by the year 2005.

Such targets and timetables are absent from the climate change convention produced at the Earth Summit. The NGOs also drafted a treaty holding transnational corporations (TNCs) “liable for the harmful effects caused by their operations in all countries of operations.” This was needed, the treaty maintains, because the official conference “abdicated its responsibility to take measures to control TNC activities.”

Despite these apparent achievements, Brazilian congressman and environmentalist Fabio Feldmann maintains that the NGO treaties lack a certain political realism. “If we want to prohibit the destruction of the forest in a logging state, the whole economy is going to be affected, so we have to propose concrete alternatives,” he says. This is just one indicator that NGOs are not ready to fulfill their new role as key social actors “co-responsible for the decision-making process,” adds Feldmann. “NGOs have to admit that they are not representing the whole of society,” and that even their contacts with the civilian constituencies they purport to represent are tenuous.

According to Capobianco, Rio gave NGOs two big reasons for optimism: the groups induced some countries to modify their official stands, and NGOs also learned to work more cooperatively with one another. “I believe our lobby with the

Brazilian delegation contributed to their changed position accepting the summit’s forest principles document,” says Capobianco. And “the conference left a great legacy to the NGO community: it’s the first time NGOs elaborated collective proposals on an international level, and thus signals a new era of NGO coalitions.”

The principal conference buzzword was “network,” he says. In fact, one of the NGO treaties establishes mechanisms for maintaining contact after the summit. The Framework Treaty on NGO Global Decision Making states that the needs of communities can best be served if NGOs form links—local, national, and international. The treaty provides for a worldwide system of communication as well as for cooperative action and decision making through regional committees and a “global NGO facilitating committee.”

Meanwhile, members of several networks that promoted participation in both the summit and the Global Forum, including the U.S. Citizens Network, the Third World Network, and the Brazilian Forum, are now meeting to ponder their post-conference role and determine how to preserve and strengthen their contacts. ■

NIRA BRONER WORCMAN, a Brazilian journalist, works for the Global Change Program of the Scientists’ Institute for Public Information, based in New York.

BRAZIL



Above: At this organic nursery in Brazil's northern state of Pará, peasants are working with agronomists to develop high-yielding strains of native food crops. The map shows the location of 9 extractive reserves (■). Brazil has also designated 10 other similar areas not shown.

mental questions. "The rubber tappers have forged a link between social issues and large-scale problems such as deforestation, says Yale University anthropologist Margaret Keck. "They are not just saying that Brazil should stop cutting down trees because it's bad for the world; they are saying that we should be treating populations differently."

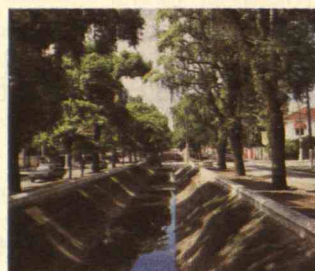
Stephan Schwartzman, an anthropologist with the Environmental Defense Fund, sees an expanding awareness among environmental groups such as EDF, which have long pursued a purely conservation-oriented approach, that deforestation is basically a human-rights issue. "Extractive reserves are the first grass-roots alternative to the kind of top-down, outside-in development debacles that have destroyed much of the Amazon," Schwartzman says. "The idea has succeeded where broader initiatives to 'save the rainforest' have failed."

Frances Spivy-Weber of the Audubon Society, which

has established branches in countries such as Mexico, Guatemala, El Salvador, and Venezuela, agrees that the focus of environmental groups is changing: trying to keep people out of ecologically sensitive land no longer works as a long-term strategy even in the United States. Working on site, Audubon and its sister organizations of the North can contribute experience in environmental advocacy while learning about the needs of local residents as well as of the land, she says.

Despite the promise of extractive reserves, both Southern and Northern activists say they have yet to prove their long-term viability. Producing commodities in quantities that supply the international market can actually disrupt the local economy and put more pressure on the forests than they can bear, says Glenn Switkes, producer of the documentary *Amazonia: Voices from the Rainforest*. "People don't yet know what sustainable development in the Amazon really means."

Right: To restore the polluted beaches of the port city of Santos, these women convinced officials to rebuild waste canals. The city also now collects garbage formerly dumped into ravines. Far right: Unchecked industrial emissions gave Cubatão its reputation as the "Valley of Death," but an environmental agency and residents have forced companies to clean up their act.



EDF's Schwartzman adds that resolving land rights is only one measure of success in the Amazon: "Rainforest residents also want long-term access to education and health care, services that most citizens expect the government to provide." Meanwhile, he fears the effects of fickle demand for forest products—especially if international interest in saving the Amazon wanes. In fact, the region has a history of boom and bust, with U.S. and European demand for commodities such as rubber, chicle gum, and lumber attaining feverish levels and then cooling off.

According to Schwartzman, long-term stabilization of the region will require examining pressure produced by unsustainable development in the rest of the country. "Many of the people who are panning for gold or cutting the Amazon to farm, including migrants from other parts of the country, are desperate—they need real options."

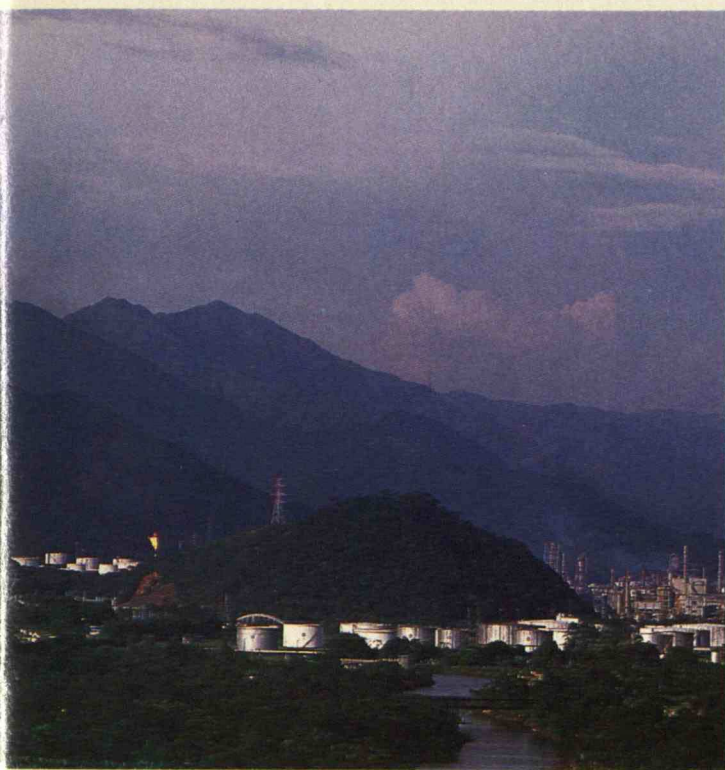
Urban Prospects

Because many people lack such options, most of the Third World's population is becoming urbanized, says Henrique Rattner, professor of political science at São Paulo University. In Brazil, hundreds of thousands of people have been evicted from their land by the mechanization of agriculture and a push to grow sugarcane for gasohol, while some two-thirds of the people who

once inhabited the Amazon rainforest have left for the cities. Cândido Gryzbowski of the Brazilian Institute for Social and Economic Analyses (IBASE) says that even Curitiba, a city in the relatively wealthy state of Paraná often cited for its ambitious public transportation and recycling program, is sustaining an influx of rural refugees that is straining its ability to provide services.

Although Northern NGOs often focus on the problems of rural areas, local NGOs and neighborhood groups are convincing many Brazilian cities to address the needs of poor residents, says Herbert de Souza, president of IBASE. Neighborhood groups have been particularly effective in monitoring local officials for corruption, which is much less severe than at the federal level, he maintains. Provisions in the 1988 constitution, adopted after 21 years of military rule, have funneled money from the federal to the local level and encouraged urban dwellers to press for better housing, schools, and water supplies.

To address a crisis of homelessness in urban areas throughout Brazil, many community groups have focused on expanding the supply of permanent housing, says Gryzbowski. In Goiânia, a city near the capital of Brasília, a federation of some 24 organizations has constructed modest dwellings for 80,000 families using the labor of residents and some funds from local government. The cities of Rio de Janeiro and São Paulo have



benefited from similar efforts to build houses on land occupied by recent immigrants.

Residents of São Gonçalo, dormitory city for Rio de Janeiro and one of Rio State's poorest municipalities, have mobilized to secure a safer water supply. Home to 1 million people, the city endures one of the country's highest rates of immigration. CEPIA, an NGO established in 1990, has been encouraging women to join forces to pressure local officials for basic services. "Women are the key to the struggle to provide potable water for their families," explains Jacqueline Pitanguy, one of the group's founders and former head of the National Council for Women's Rights. As a result of CEPIA-sponsored debates on the connection between the neighborhood's quality of life and women's health needs, municipal authorities have begun to upgrade the sewage system and are funding a program to provide reproductive care.

In Santos, a major southern port with half a million residents, an enterprising group of mothers formed an NGO in 1990 to reclaim the area's polluted beaches, which suffered from decades of illegal sewage and industrial-waste disposal from several nearby cities. With support from businesspeople, students, and other citizens, SOS Praias convinced state and local officials to fund new waste-treatment plants and crack down on illegal dumping, generating much-needed jobs in the process. Santos is also working with neighborhood

groups to install a sanitation system in densely populated poor communities, and to set up a program to collect household waste formerly dumped into nearby ravines. Recycled wastepaper has been used to supply schoolchildren with 200,000 notebooks.

Urban areas often suffer from environmental degradation of the surrounding countryside. Roberto Klabin, president of SOS Mata Atlântica (the nation's largest environmental organization), says that the few remaining stands of timber along the industrialized southern coast must be protected to prevent landslides that crush impoverished communities clinging to steep land. In the town of Iguape in São Paulo State, Klabin's group has established an agricultural school and experiment station to promote sustainable harvesting of *caixeta*, a tree that inhabitants cut and sell to manufacturers of products such as pencils. Working with the U.S.-based Nature Conservancy and Conservation International, the group is also fostering sustainable oyster production among coastal communities so that residents are not forced to cut the dwindling forest.

Cetesb, a publicly owned environmental company in São Paulo State, has enlisted the help of neighborhood groups in tackling oppressive air pollution in Cubatão. NGOs in the city, known as the Valley of Death and site of some of the country's worst air quality, have claimed a link between emissions from petrochemical and steel plants, as well as factories owned by multinationals such as Union Carbide and Monsanto, and a high incidence of serious birth defects. In the late seventies, the World Bank established a line of credit to enable companies to install pollution-control equipment. But not until a gas pipeline exploded in 1983, killing up to 200 people, did Cetesb gain enough clout to convince the companies to act.

Holding neighborhood seminars and encouraging residents to use a hotline to report noxious fumes, the agency pressured the companies to buy the new equipment. The result was a significant cut in emissions—although Maria Carmen Lemos, a Brazilian graduate student in political science at MIT, cautions that the gains have improved conditions only "from horrible to bad." Still, Cetesb has been asked to help other states reproduce its results. And the experience may draw a second look from national and local leaders who maintain that dealing with pollution cannot be a priority amid other pressing concerns.

NGOs Look Ahead

To have a lasting effect, rural and urban NGOs must forge a common platform—a task that participants hoped the recent Global Forum would facilitate.

According to Yale's Keck, conference preparations accelerated contacts within Brazil among usually fractious environmental groups, women's groups, and unions. Gryzbowski, of IBASE, says the summit also prompted discussion among many Brazilians about the link between deteriorating environmental conditions and widespread poverty. "People realize that if poor citizens build slum housing on sensitive land, it's because they have been excluded from the mainstream economy." He credits the rubber tappers with bringing home this connection.

Such realizations are important because the impact of Agenda 21—the nonbinding blueprint for sustainable development signed by governments attending the summit—will depend on domestic politics in Brazil and elsewhere. Says former planning secretary Magalhães, now head of an NGO that hopes to bring responsible development to the arid Northeast, "If you don't have local conditions in each country that encourage sustainable development, then outside funds and treaties won't work."

Such conditions may be building in Brazil. Political science professor Rattner sees a growing realization that "the current world economic model based on the validity of the market and ruled by the international banking system has brought Brazil to a stalemate, producing a polarized society based on waste." He cites the tentative efforts at self-management led by NGOs as evidence of a deep desire for change, and sees a movement among small-business leaders, mid-level government employees, and people active on the local level to create a new model of development.

Magalhães points to progress at even the top levels of government in rethinking a model of development that excludes huge segments of the population while putting untenable stress on natural resources. A recent article on sustainable development written by President Collor "would have been impossible only two years ago," he says, while Brazil's report to the summit highlights public participation as essential in overcoming poverty and preserving the environment.

The Earth Summit itself reflected an accelerating influence of NGOs on the national and international level. "UNCED's emphasis on community involvement was unprecedented," says Audubon's Spivy-

Weber, with smaller grass-roots organizations as well as major environmental groups participating in two years of preparatory meetings. "It's hard to find a page of Agenda 21 that doesn't refer to some aspect of community."

While NGOs looked to the Global Forum to help cement their widening national and international contacts, EDF's Schwartzman cautions that one event cannot instantly enable NGOs to make common cause. Governments have had 50 years to organize forums to address UNCED's agenda, he says—civilian groups are just beginning to set up their own such forums. To help maintain the momentum, U.S. environmental groups are meeting to devise a joint strategy for "doing what Rio failed to do," says Liz Barratt-Brown of the Natural Resources Defense Council, and to promote sustainable development in the United States. Such joint efforts will be particularly valuable in monitoring compliance with the summit treaties, she maintains, especially since the newly established U.N. Sustainable Development Commission will rely partly on reports from NGOs.

While applauding the NGO influence on the summit agenda, she laments that some of the major players were missing from the official conference. UNCED chief Maurice Strong's original vision included participation by corporations as well as governments and NGOs. But the Rio Declaration—the summit's general statement on sustainable development—and Agenda 21 omit any reference to multinationals. This despite the recommendation of the Business Commission for Sustainable Development that the U.N. adopt a version of U.S. right-to-know laws and Toxic Release Inventory, which mandate disclosure of hazardous substances. Wastefully high military expenditures were another glaring omission from the UNCED agenda, says Barratt-Brown.

Yet for all its flaws and uncertain long-term effects, both the main summit and the Global Forum put the important issues on the table, maintains Magalhães—and those were not limited to natural resources alone. "The lesson we are all learning is that development has to be constrained by both social equity and the environment. The focus has to become one of improving human resources." ■



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Cover:

A poster designed by Jackie Casey for a 1982 Hayden Gallery exhibit entitled "Intimate Architecture: Contemporary Clothing Design." The photographer for the poster and the exhibit's catalogue was Robert Mapplethorpe.



A Pall Over University Science

The grimness of the situation attracted a thoughtful and articulate group of researchers to MIT in June, for the Boston-area hearings of the President's Council of Advisors on Science and Technology (PCAST). Graham Walker, a professor of biology at MIT, set the tone when he said he was "deeply concerned about the present climate of distrust of science and scientists in Washington, and by the way this distrust is being fueled by highly visible members of the political system."

Walker predicted that if this climate persists, "it will be difficult to get students to consider research careers, to obtain the funds necessary to provide the research base needed for this country's continued development, and even to exploit breakthroughs in basic research for society's benefit."

This public hearing was one of a nationwide series, organized by PCAST as part of a study of "research-intensive universities and their relationships with the federal government." Presenters included MIT and Harvard administrators, faculty, graduate students, and even an undergraduate, almost all of whom presented a litany of concerns.

Jacqueline N. Hewitt, a radio astronomer and Class of 1948 Assistant Professor of Physics at MIT, came down on "the lack of sustained financial support for equipment and instrumentation that is critical for doing research in a university environment." Robert D. Howe, assistant professor of mechanical engineering at Harvard University, observed that less than half the PhDs in engineering granted by U.S. universities go to Americans. To build up that number, he suggested an increase of \$500 to \$800 per month in federally funded stipends, paid directly to the students rather than out of grants, and the creation of a special pool of research funds for young engineering researchers.

The financing of young researchers was also a major concern for MIT Provost Mark Wrighton. While MIT charges \$23,000 in tuition for graduate students, he said, this represents only half the cost of

graduate education, and MIT must make up the difference from gifts and endowment income. Even more troubling are the costs imposed on universities that enroll graduate students supported by federal programs that pay far less than full tuition. For example, MIT enrolled more than 220 National Science Foundation predoctoral fellows in the 1991-92 academic year, Wrighton reported, and the Institute was required to accept a \$7,500 "cost of education allowance" for each fellow "in lieu of tuition and fees." That resulted in a tuition shortfall of more than \$3.5 million that had to be absorbed by the Institute's general funds. Wrighton said that other federal agencies are considering similar policies.

One way to support tuition for graduate students, Wrighton said, is by charging the fringe benefits pool, the current practice at MIT, Caltech, Stanford, and Columbia. But that procedure is threatened by proposed changes in federal policy, and the university community is anxiously awaiting the results of a study by a government task-force, due out this fall.

Gina Raimondo, an undergraduate economics major at Harvard, urged the government to provide more support for undergraduate research. Currently involved in her own research on inappropriate use of health care facilities, Raimondo noted that "it is only when students begins to test and explore the theories that they begin to really learn and develop a deeper understanding of a field." More programs like MIT's Undergraduate Research Opportunities Program, she said, could go a long way toward compensating for the faculty neglect often experienced by undergraduates.

The PCAST hearing rang with denunciations of Congress' increasing reliance on "earmarking"—the direct funding of pork-barrel projects—instead of peer review; Wrighton said that more than \$1 billion in research funds was allocated through earmarking last year. Because peer-reviewed research is "the creativity engine that drives this country's science," Walker maintains, earmarking abrogates the contract that has prevailed for decades between the U.S. government and the research scientists and engineers concentrated in universities.

MIT President Charles Vest also invoked a traditional contract, noting that

the rationale for the "social contract between the American people and their institutions of higher learning" has been the effectiveness of university research in developing defense technology and advancing medical science and public health. Vest called defense and health the "two pillars" that upheld federal support for research universities like MIT. "With the decline in the probability of catastrophic world war, the concept of national security is being redefined in civilian economic terms," he said. "As a result, the traditional motivation for much of the government's support of research and development has declined." Yet that diminished federal motivation comes at a time when internationalization, scientific opportunity, and technological challenges combine to make research efforts as vital to national interests as ever, he observed.

If it is necessary to develop a new rationale for university/government relations,

the "civilianization" of defense technology becomes an important topic, as it was at this forum. According to Wrighton, the U.S. government should be particularly careful in managing Department of Defense research in the post-cold war era. He noted that the DOD's research has been particularly fruitful in the past—yielding, for example, the collision-avoidance system developed at Lincoln Laboratory that has already been installed on half of U.S. commercial aircraft. DOD was successful, Wrighton said, because it focused on the long term through ample funding and continuity of research management.

Severely limited resources was another recurring theme. Robert A. Brown, head of MIT's Department of Chemical Engineering, noted that university scientists find themselves writing many more grant proposals than ever before, and winning smaller grants for each successful application. University scientists and engineers

are coming under increased pressure to do directed research for industry, or even leave universities altogether for industrial jobs, Brown said. Meanwhile, Congress has been investigating universities' links with foreign companies and governments, as well as the universities' accounting for indirect research costs, while aggressively probing supervision by government agencies of alleged fraud and misconduct by scientists.

It's no accident, then, that President Vest, Provost Wrighton, and Harvard Medical School Dean Daniel Tosteson all cited the erosion of public and political support for university science and the good reasons, in their view, for university paranoia. Said Vest, "I must frankly admit that a pall lies over this discussion." □

—VICTOR McELHENY (The author is the director of MIT's Knight Fellowship Program in Science Journalism.)



It was a moment when current volunteer leaders—the members of the MIT Corporation—took time out last spring to honor veteran volunteer leaders—the presidents of the Association of Alumni and Alumnae of MIT. Of the 28 living gradu-

ates who had served as Association president, 17 were able to be on hand for the historic occasion. Seated, from left: Howard L. Richardson, '31; Samuel A. Graves, '34; Claude W. Brenner, '47; Harl P. Aldrich, Jr., '47; Norman B. Leventhal,

'38; Breene M. Kerr, '51; and Theodore T. Miller, '22. Standing: Joe F. Moore, '52; Harris Weinstein, '56; Angus N. MacDonald, '46; E. Milton Bevington, '49; Emily V. Wade, '45; D. Reid Weedon, Jr., '41; Paul E. Gray, '54 (chair of the Corporation);

Charles M. Vest (president of MIT); William J. Hecht, '61 (Association executive vice-president), Robert W. Mann, '50; Edward O. Vetter, '42; Peter M. Saint Germain, '48 (Association president at the time of the photo); and Christian J. Matthew, '43.

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MIT Challenges Military Discrimination

For the last two years, the MIT administration and faculty has issued a forthright challenge to the Pentagon on what is promising to be one of the more hotly contested issues of the coming presidential campaign: a standing Department of Defense (DOD) policy that prevents gays and lesbians from service in the U.S. military. Democratic nominee Bill Clinton has stated publicly that he would reverse the ban if elected, while President Bush, who could reverse the ban by executive order if he chose, has reiterated his support for it.

Although DOD officials originally justified it as necessary to avoid exposing officers to potential blackmail, they now merely contend that homosexuality is "incompatible with military discipline." Oddly enough, the claim is contested not only by gay and lesbian military personnel who have been dismissed, but by two internal DOD reports, neither of which the Pentagon has ever released. Similarly, a recent study by the General Accounting Office surveyed military policies in 17 Western nations and found that 12 allow homosexuals to serve, without noticeable effects on military discipline, although some nations place certain restrictions on admitted homosexuals.

While MIT is no stranger to issues of national prominence, its institutional involvement on a matter of social policy that has little direct impact on either education or science and technology might seem unusual. The Institute, however, is home to a 400-member Reserve Officer Training Corps (ROTC) program involving students from three other colleges in the Boston/Cambridge area. ROTC pays stipends and for many members full tuition, in return for military training and a four- to five-year commitment to a branch of the armed services after graduation. ROTC trainees, of course, are subject to the same regulations that govern the military as a

whole. And ROTC's "no homosexuals" policy runs directly counter to MIT's stated opposition to discrimination on the basis of sexual orientation.

Concerns about ROTC have been simmering within the MIT community for some time. A faculty committee reporting in October 1989 warned that MIT could not continue to host indefinitely a program that contravened its non-discrimination policy. But the controversy over ROTC policy on gays and lesbians really heated up in November '89, when Robert Bettiker, '90, a Navy midshipman majoring in chemistry, realized he was gay and decided to tell his commanding officer. The Navy quickly moved to "disenroll" Bettiker, who is now a student at Georgetown University Medical School. At the time, a review board found no evidence that Bettiker had deceived the military about his sexual orientation and added that his homosexuality was the only "black mark" on his military record. Despite such findings, a higher review board demanded that Bettiker repay the ROTC scholarship he had received to date—a total of \$38,612.

"I didn't think I should repay the money—after all, it was the Navy's policy, and I was making clear at all times that I was willing to serve out my commitment," says Bettiker, who wrote to Lawrence Garrett, then-secretary of the Navy to protest the decision. When he received no response, Bettiker took his case to a gay rights lawyer, who in turn contacted Representative Gerry Studds (D-Mass.), one of two openly gay members of Congress. Studds and 35 other legislators fired off a letter to Garrett on March 29, 1990, arguing that the Navy had no right to ask Bettiker—and a Harvard ROTC student who had been similarly dismissed—to repay their scholarships. "In each case before you, the midshipman involved conducted himself in an open and forthright manner," the lawmakers wrote. "What if these men had been dismissed due to some other disqualifying factor? Would they be compelled to repay the Navy in that instance? We think not."

In the meantime, MIT became officially involved. Then-Provost John Deutch wrote a well-publicized letter in early April 1990 to Secretary of Defense

Richard Cheney, asking Cheney to reconsider the DOD ban on homosexuals. "A faculty member cannot be expected to support an activity on campus that is in direct contradiction to the principles of the university," Deutch wrote, calling the ROTC policy "wrong and shortsighted." By early June, the Navy had agreed to waive its request for reimbursement.

Deutch's letter, however, was just the beginning of MIT's growing activism on the issue. Later that year, the faculty passed a resolution calling on the administration to evaluate the ROTC program by 1995, with an eye toward "making ROTC unavailable to students beginning with the class entering in 1998" if "significant progress" is not made toward dropping the ban on homosexuals. And in May of this year, MIT President Charles Vest wrote to Congress in support of a bill introduced by Representative Patricia Schroeder (D-Co.) that would lift the DOD ban. MIT "fully endorses" what he calls "a crucial piece of legislation," Vest wrote, concluding, "I applaud your efforts in this important area." MIT has also been collaborating with other major institutions that host ROTC units to lobby for a change in policy. Congressional staffers, however, say Schroeder's bill is unlikely to pass this year. And even if Congress approved it, it would still face an almost certain veto by President Bush.

Barring Clinton's election, which would pre-empt the issue, the stakes for MIT and its ROTC program are likely to rise yet higher in coming years. But MIT administrators suggest they would be content with a face-saving compromise—one in which the Pentagon abandoned attempts to force out all self-declared homosexuals and returned to its pre-W.W. II policy of discharging only homosexuals caught in sexual acts. "We're trying to be very reasonable about it," says Sara Gallop, Vest's assistant for governmental relations. "We're looking for a compromise. We don't want a battle [with the Pentagon]. We just think the policy is wrong." In the absence of such a compromise, however, even Gallop admits that it is "possible" that MIT could end up severing its ties to ROTC within the decade. □

—DAVID HAMILTON '88 (The author is a reporter at Science magazine.)

How Sweet It Is

There was cause for celebration when MIT captured its first national College Bowl title last spring by defeating Stanford twice in a final championship round. The MIT team, captained by James Sarvis, '93, includes freshman Eric Tentarelli, Sloan School graduate students Larry (Chip) Hunter and Daniel LaGattuta, and alternate Kyle Pope, '92.

This was the third time in the past five years that MIT has qualified for the College Bowl National Championship Tournament, and the second time in as many starts that Chip Hunter, who is studying labor relations, was named by fellow

championship players to the tournament All-Star Team. LaGattuta was also named one of this year's All-Stars.

The process is launched at MIT during Independent Activities Period, when the Student Center Committee sponsors the IAP Games Tournament and sends the winners to the New England competition. MIT earned a berth at the 1992 National Championship by defeating Brandeis in the final match at that regional tournament.

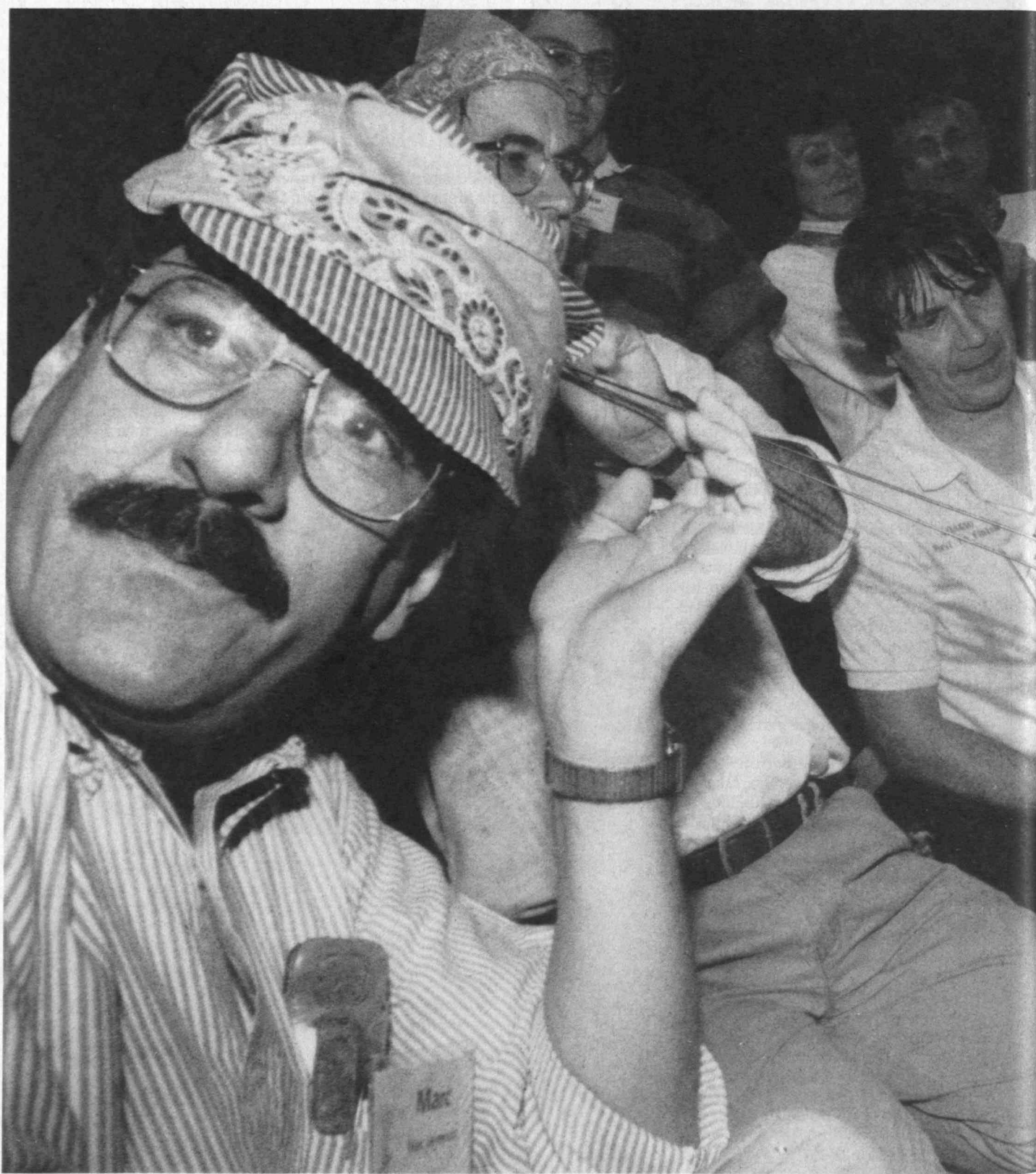
Sixteen teams from around the country met in Washington, D.C. for the round-robin National Championship Tournament, where Stanford and MIT won the opportunity to face each other in the finals by taking 12 and 11 of their 15 preliminary bouts, respectively. □



MIT was the site of a major American literary event last spring, when the Institute hosted one of author Toni Morrison's rare public appearances in conjunction with the release of her newest novel, *Jazz*. Almost a year earlier, Morrison had been invited by Ellen Harris, associate provost for the arts, to give the 1992 William L. Abramowitz Lecture in April—coincidentally, only weeks after the book hit the stands. Morrison was chosen for this year's lecture with the Class of '92 in mind: as freshmen, they read her earlier work, *Beloved*—for which she was awarded the 1988 Pulitzer Prize—and they participated in activities built around the book as part

of their freshman orientation.

An overflow room with closed-circuit television had to be set up for the hundreds of members of the campus community who couldn't find seats for Morrison's lecture in Kresge Auditorium. During a two-day campus residency, the writer also met with students, faculty, and staff in a variety of smaller settings. Morrison is on the faculty at Princeton University, and her appearance at the Institute "underscores MIT's commitment to women, the arts, and cultural understanding," Harris said. The Abramowitz Lecture Series was established by William J. Abramowitz, '36, as a memorial to his father.





Reunions '92

You Can Go Home Again

By John Mattill

Drawn by complex and infinitely varied combinations of curiosity, pride, nostalgia, camaraderie, and intellectual inquiry, some 2,600 sons, daughters, families, and friends of MIT returned to the campus during the first week in June. Their reward was equally diverse: stimulation, renewal, fulfillment, and plain fun—all of it generated by class reunions and the accompanying annual rites of Commencement, Tech Night at the Pops, and Technology Day.

It was the largest crowd in the 20 years that these events have had their current format, perhaps for any T-Day since MIT staged a spring spectacular to celebrate its move from Boston to Cambridge in 1916.

Symphony Hall applause meters must have been heading off the scale when Associate Conductor Harry Ellis Dickson raised his arms to end the Boston Pops Orchestra's annual tribute to MIT on June 4. It was a near-capacity audience, with the floor seats well populated by members of the Cardinal and Gray (50 years and more graduated), resplendent in red jackets. Having the con-

A rainy reunion Saturday provided a perfect excuse for total immersion in a modified 2.70 contest. The goal: out of a box of standard parts, to construct a "grain elevator" that could lift a can of corn. Shown is a team from the Class of '67.

Reunions 92

ductor's son-in-law, former Governor Michael Dukakis, on hand added to the ambience; so did conductor Dickson's perfect compliment—he borrowed a red jacket for the occasion.

Friday sessions on technical and managerial challenges to industry in the United States drew enthusiastic reviews (*see page MIT 11*); and an intense crowd assembled on Saturday for a forum on K-12 education arranged by the Class of 1962, with former presidential candidate Paul Tsongas as keynoter (*see page MIT 13*).

Alumni/ae reunion gifts and pledges that came to just under \$32 million gave President Charles Vest an emotional lift at the annual Technology Day luncheon. Vest admitted that these are "hard times for university presidents." But he urged his audience to "go public with your commitment to the Institute and its vital work. Go tell it on the mountain—or at least to your congressman and newspaper editor."

Its intellectual start notwithstanding, Saturday's focus was fun. The Class of 1967 won the annual Reunion Challenge Games, which included volleyball, problem sets, a sack race, a 2.70-style design contest, and even a re-creation of the historic glove fight with water-filled rubber gloves. Recalls Eliza Dame, program director for reunions, who with her associate Chris Foglia managed the mayhem, "These folks were great. There is no lack of competitive spirit among MIT classes."

Partying continued on Saturday evening. The Class of 1962's dinner-dance in Faneuil Hall had passers-by dancing on the sidewalks outside. And the reunion shindig for young alumni/ae—the Classes of '77, '82, and '87—at the Cambridge Marriott's "Characters" club won the ultimate accolade: virtually all the Alumni/ae Association staff checked it out—and stayed: they know a good party when they find one.

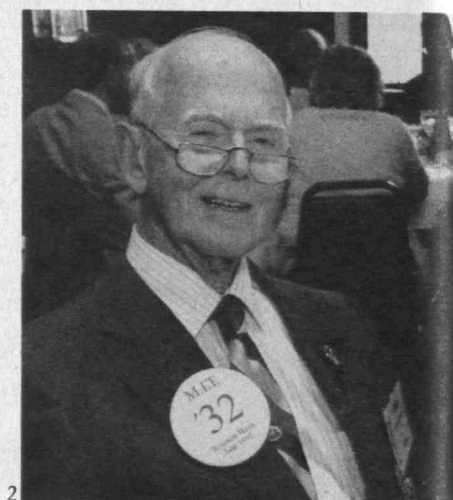
When President Vest took the podium at the T-Day Luncheon to acknowledge the \$32-million-plus vote of confidence, his smile said it all: the gifts were a high spot in what he characterized as a bittersweet year for leading U.S. universities.

On the bitter side of the balance, he listed several problems in relations with the federal government: efforts to reduce its financial responsibilities for sponsored research, anti-trust challenges to university policies on student financial aid, and bureaucratic decisions affecting the content and vitality of arts and humanities programs.

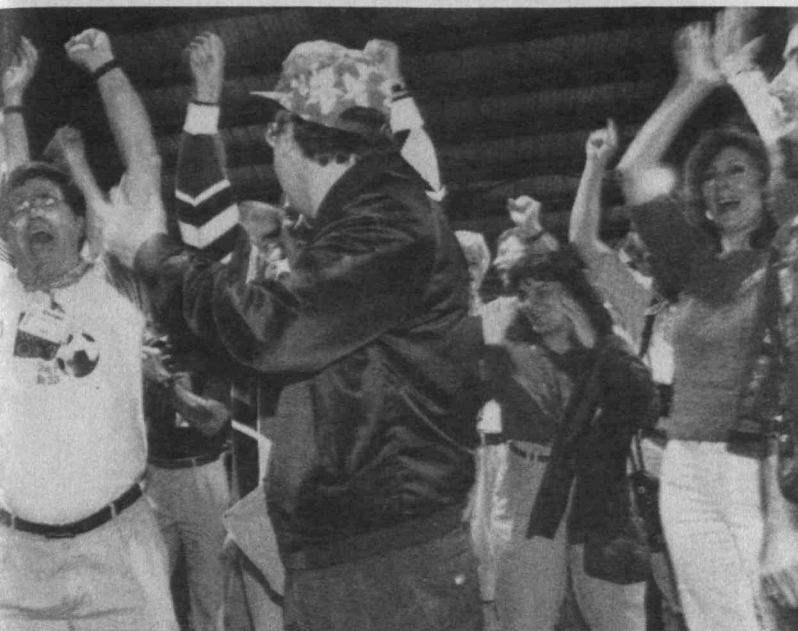
Issues such as these tend to monopolize public attention, Vest said. So it's especially important that MIT people everywhere "take great satisfaction in the quality and outstanding accomplishments of faculty, students, and graduates." He advised his constituents to "observe what is going on here and renew your commitment to the Institute and its vital work."

For all alumni/ae in his audience, Vest offered a unique example. Recalling his delight in meeting Martha E. Munzer, '22, the president said "she captures the spirit" he seeks for himself and the institution he leads: "To always reach a bit beyond one's grasp, be willing and ready to take a chance when the next step points in a new and untried direction, and keep learning, marveling, and laughing."

The honors for oldest alumnus at Technology Day events went to Max Seltzer, '18, founder of the Cardinal and Gray Society. And in other important business at the T-Day luncheon, Professor Ronald M. Latanson, chair of MIT's Council on Primary and Secondary Education, was made an honorary member of the Alumni/ae Association, in recognition of his success in "involving alumni and alumnae in MIT's advocacy of improved mathematics and science literacy in the nation's schools." □



(1) The Class of '67 team erupts with delight when they win the 2.70 Contest; the class went on to reap further gold as the all-around winner of the Reunion Challenge Games. (2) Reunion chair Tom ('32) and Rose Weston at Anthony's Pier 4 restaurant. Rose pitched in to help organize the 60th reunion when Tom fell ill. (3) Lutz Henckels, '67, and his most recent magnum opus, the 25th Reunion book. (4) 25th Reunion Gift Co-Chair Jeff Wiesen, '67, had the pleasure of announcing his class had raised \$1.7 million for the Alumni/ae Fund; (5) 40th Gift Chair Joe Moore, '52, presented \$3.3 million; and (6) 50th Reunion Gift Chair Floyd Lyon, '42, \$10.1 million. (7) The president and his wife traditionally host receptions at their home in honor of the 25th and 50th reunion classes. Two members of the Class of '67 take the opportunity to converse with President Charles Vest (right).



Reunions '92

1992 Was a \$32 Million Year

The 50-year Class of 1942 started making records on Commencement Day, when 130 of its members marched to much applause in a rain-altered version of the Commencement Procession. It was the largest 50-year contingent since this tradition was revived in 1987. Later that day they descended in record numbers on the Woodstock Inn in Vermont. And at the Technology Day luncheon came the biggest record-breaker of all: a stunning 50th-reunion gift of \$10.1 million, presented to President Vest by gift chair Floyd A. Lyon. It was the largest single reunion fund in MIT history, breaking the record by some \$2 million. Like the other major class gifts, the 50th gift includes all the class's contributions during the previous five years and pledges to be fulfilled in the next five. In addition, said Lyon, classmates reported arrangements for future gifts to MIT estimated at more than \$4.5 million.

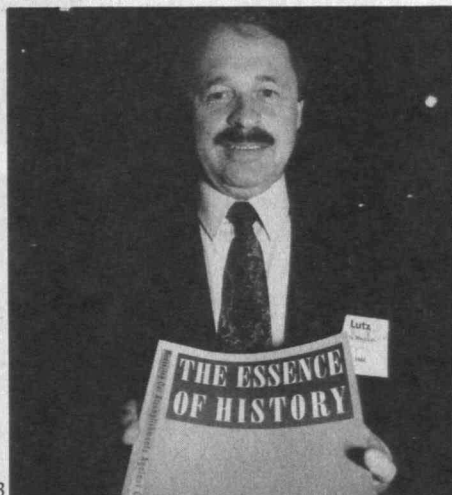
Close behind came the Class of 1927, whose 65th-reunion gift of \$8.6 million also exceeded any previous reunion total. And there was a first-ever reunion gift from a 70-year class of \$1.3 million. Six members of that Class of 1922 were present, including 3 of the 21 women who received MIT degrees in June 1922.

Reporting for his 1967 classmates, gift chair Jeffrey M. Wiesen announced a 25th-reunion total of \$1.7 million. Much of the money was designated for a fully endowed scholarship honoring Kenneth R. Wadleigh, '43, dean of students during the class's undergraduate years.

Gift chair Joe F. Moore said the Class of '52's 40th-reunion gift—a total of \$3.3 million, much of it earmarked for MIT's efforts



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to improve K—12 education in mathematics and science—should be taken as a positive response to the country's "nagging questions about modern schools and social institutions."

Other class gifts reported at the luncheon by Peter M. Saint Germain, '48, then-president of the Association of Alumni and Alumnae of MIT:

■1992. Before they graduated, the class pledged \$23,330 by 1997 to support MIT's Program for the Encouragement of Technology, under the aegis of the Council on Primary and Secondary Education.

■1987. Gifts of \$20,200 in 1991–92 were reported by gift chair Sherman C. Luk; many were earmarked for the class's new student aid fund, Saint Germain noted.

■1982. According to the report from gift chair Charles Frankel, his class made total reunion gifts of \$47,500; 35 percent gave \$100 or more.

■1977. Stimulated by a challenge grant from classmate Brian Hughes and mobilized under gift chair Carol C. Martin, the class gave \$101,700. Fifty-three percent of the gifts were \$100 or more, and the class student aid fund stands at \$162,000.

■1972. Gift chair Steven J. Henry led his confreres to the first 20th-reunion gift in MIT history—a total of \$165,600; 43 percent of classmates contributed.

■1962. The class was led to a "remarkable" one-year total of \$2.54 million by gift chair Arthur J. Samberg, said Saint Germain. Nearly 70 percent of all 30th-reunion gifts were for \$100 or more, and 45 percent of the class participated.

■1957. Three hundred and thirty members of the class gave \$433,000 in fiscal '92, with \$50,000 of the total earmarked for classroom renovation.

■1947. Raising a 45th-reunion gift for the first time in MIT history, the class reached \$559,300 under the leadership of Harl P. Aldrich, gift chair, and Claude W. Brenner, president; 41 percent participated, and

\$50,000 was marked for the class's career development professorship.

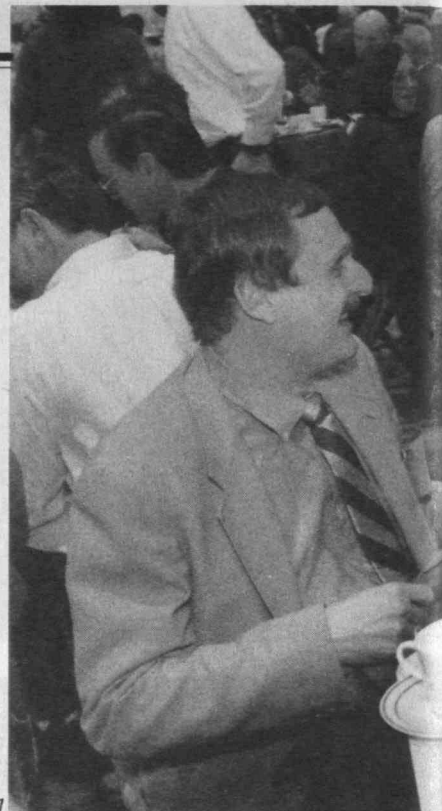
■1937. The work of Joseph F. Keithley and George S. DeArment, co-chairs, and many classmates resulted in MIT's first 55th-reunion gift: \$563,000. It included contributions from 55 percent of the class, and this year twice as many donors gave \$1,000 or more.

■1932. Three members of the class, Wendell E. Bearce, John J. Brown, and Melvin Castleman, led an effort that resulted in \$2.4 million given by 83 percent of the class during the five years starting in 1987; the median gift was over \$300, Saint Germain said.

And when it was all added up, the reunion gift total came to more than \$32 million, a banner year.—John Mattill □

(The author is editor emeritus of Technology Review.)

(1) Former Dean of Students Kenneth Wadleigh, '43 (seated to the right of his wife, Jean Wadleigh, with Chuck Kolb, '67) was honored by the Class of 1967, which set up a fund in his name. (2) Morton Goulder, '42, left, toasts a classmate in the garden of the president's house at the reception in honor of their 50th. (3) Although it rained most of reunion Saturday, the precipitation abated long enough for one event to be held outdoors—a reprise of the "Glove Fight" fought with water-filled rubber gloves. Definitely an outdoor event. (4) Wish we were in on what it was that amused Cordelia Price, '78, and Bob Seamans, PhD '42, members of the 1992 Technology Day Committee . . . (5) Technology Day Panel members (from left): Don Lessard (Sloan professor of international management), Sumantra Ghoshal, PhD '85 (associate professor at INSEAD in Fontainebleau, France), Paul Gray, '54 (chair of the Corporation), and Richard Schmalensee, '65 (the Gordon Y Billard Professor of Economics and Management). (6) Dean Joel Moses, PhD '67, of the School of Engineering, another Tech Day panelist, invokes the qualifications of an ancestor in his T-Day presentation.



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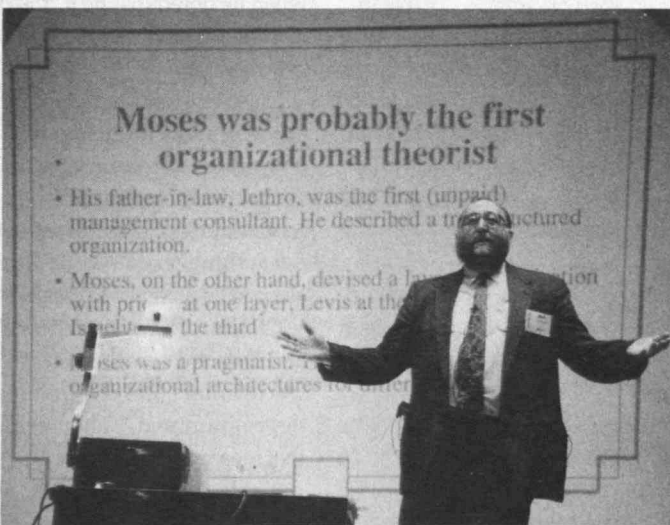
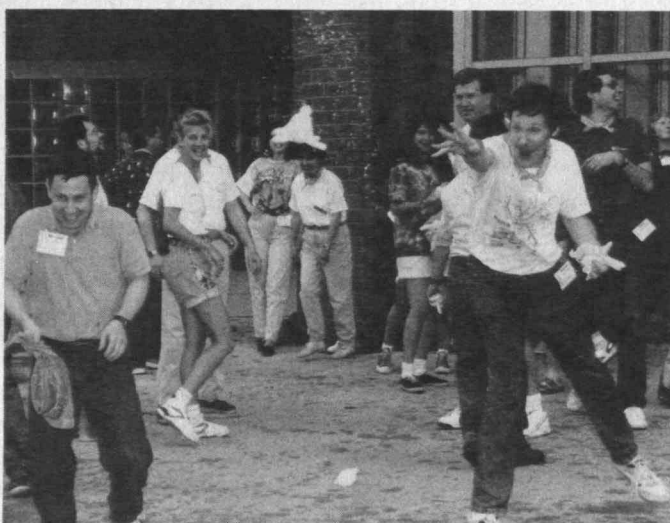
From “L.A. Law” to “Detroit Manufacturing”

By Tom Ehrenfeld

Manufacturing is going to become prestigious; it will attract the best and the brightest,” MIT Professor Thomas Magnanti predicted at his Technology Day panel. And we’ll know the millenium has arrived, Magnanti proposed, when the top-ranked television program is not “L.A. Law,” but “Detroit Manufacturing.”

It was a tantalizing prospect, and surely matched the values, if not the expectations, of his audience. The traditional T-Day plenary session in Kresge was a feast of insights on the challenges confronting this country’s organizations—industrial, political, and educational—as they head into the twenty-first century. And the many afternoon panels gave speakers and audience a chance to zoom in on narrower slices of organizational reality. The only problem—for magazine editor and reunion-goers alike—was choosing from a meaty list of options.

We chose “Transforming American Manufacturing,” where Magnanti described MIT’s Leaders for Manufacturing Program, which he co-directs. He noted that MIT, once the source of more manufacturing innovation than manufacturing curriculum, is collaborating with 13 corporate partners to chart new waters in education. The “key issues in manufacturing are neither technology nor management but are at the interface of the two,” he said, so that is where Leaders for Manufacturing directs its attention.



Magnanti is preparing his students for a world in which the best manufacturing organizations will:

- become "learning organizations" that continuously teach themselves how to improve;
- integrate diverse functions such as finance, research, marketing, and human resources into one seamless effort;
- focus as much on the processes by which they make things as on the products;
- and form new types of partnerships that enable them to both compete and collaborate with their current rivals.

On the panel with Magnanti were two industrialists, CEO Gordon Forward, ScD '66, of Chaparral Steel, and David Marsing, the plant manager at Intel in Albuquerque, N.M.—that company's largest plant. Together they described slimmed-down, knowledge-based, continually improving, technology-driven companies that truly value and depend on human capital.

Marsing's plant produces processor chips. For these products, the demands of rapidly changing technology, shrinking product-development cycles, and staggering new plant costs—up to \$1 billion—mean that the company's only hope of surviving and earning a reasonable return on investment is to constantly improve quality. In turn, those goals only can be met by utilizing high-powered personnel much more effectively. Though the company hired individuals who were the best in their fields, according to Marsing, "as a group they were dysfunctional. They hadn't been taught how to work together." When the volume of business picked up and it was vital to tap into the group's collective knowledge, "we were completely at odds with one another."

A new process-evaluation system, which makes achievement of group objectives and

rating by peers rather than by supervisors the new standards, turned his factory around, Marsing reports.

Marsing and Chaparral's Forward agreed that building a huge staff is not the solution to industrial problems. "The pitfall of growth," said Forward, "is that you lose your ability to respond quickly." Forward is a self-described refugee from traditional "Big Steel," and he now heads what panel moderator Daniel Roos, '61, (director of MIT's Center for Technology, Policy, and Industrial Development) calls "the most innovative manufacturing company in the United States."

Forward doesn't believe pundits who say this country is deindustrializing. What we are seeing, in his opinion, is a form of metamorphosis. "If we are going to talk about a real revolution, we need to throw out the word *manufacturing*," says Forward, explaining that the word comes from the Latin, meaning to make by hand. Chaparral, he says, coined the phrase *mento-facturing*. "It is time to make things with our minds." Forward predicts that ultimately Chaparral will "look a lot more like a software company than a traditional manufacturing company."

Forward is no abstract industrial theorist: he has the production record to back up his ideas. In 1975, when Chaparral was founded, big steel companies required 10 employee-hours to make a ton of steel. Today Chaparral takes 1.3 hours, while even their best Japanese competitor is only at 2.3 hours, he said.

To become an international low-cost supplier, the company had to use human resources more effectively than any of its predecessors. Their personnel philosophy was designed to avoid what Forward terms "demotivating factors:" instead of the 26 layers of management found at big steel companies, Chaparral has 3; every employ-

ee has full access to financial information; work teams in all areas of production have the power and knowledge to change the way things happen; and the 70 engineers among Chaparral's 950 employees are line managers on the factory floor.

If the company produces a defective product—say a rod that bends when it shouldn't—the employees who made the rod, *not* the sales team, will visit the customer. All this adds up to making production the center of the company, Forward explains, not an appendage.

When the company went public, each employee was given a share, and every employee has the opportunity to purchase shares through an employee stock ownership program. "If we are really going to tap into the individual, then he or she must be a real owner. That is my interpretation of a learning organization," Forward said.

Chaparral also tries to optimize technology transfer in developing new tools. Because all of the steel it makes is recycled, old cars are a prime resource. So the company developed the world's fastest auto shredder, which reduces a car to a pile of steel in 18 seconds. Forward drew a laugh when he noted that he's "the only optimist in a traffic jam; I love being surrounded by raw material."

Chaparral emphasizes continuing education in every form. Eighty-five percent of its workers take some form of coursework within the company, which has eight classrooms and six full-time instructors teaching everything from vector mathematics to electronics, Spanish to creative writing.

Chaparral hires about 1 in 20 who apply, and Forward says they find that veterans of traditional steel companies have to be deprogrammed. "They keep looking for that meeting to go to." □

(The author is a staff writer at CFO magazine.)

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K-12 Education is a Top Drawing Card

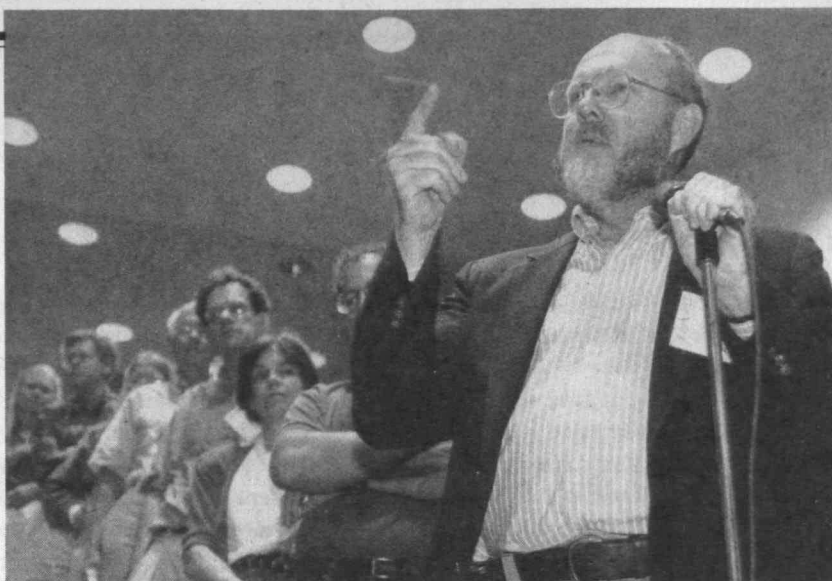
By Jim Hight

When it was time for the Class of '62 Forum on Policy Issues in K-12 Education to break up on June 6, the audience wanted to skip lunch and keep the discussion going. The reluctance of these several hundred people to leave was an indicator of both the power of the topic to galvanize MIT alumni/ae and of this particular assembly to hold their attention.

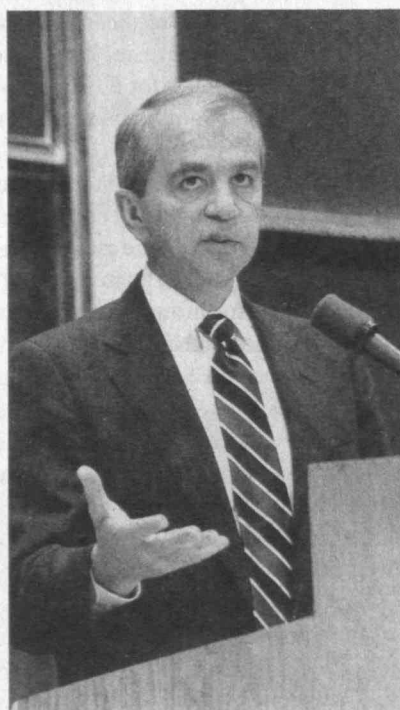
With the help of MIT's Council on Primary and Secondary Education, class members convened a remarkably diverse panel of legislators, business leaders, teachers, administrators, and journalists, with Paul Tsongas, former Massachusetts senator and presidential candidate, delivering the keynote address.

In three hours, the speakers sketched a complex and grim picture of American public education besieged by problems on all sides. But along with the bleak facts, some practical ideas for reform were exchanged—from new financing mechanisms for schools to an illuminating example of individual initiative in giving the schools a boost.

Tsongas set the tone for the morning. Barely a month off the campaign trail, he was relaxed and easygoing, salting his remarks with dry humor while conveying his deep concern about the status of education. Tsongas first spoke about his father, a first-generation immigrant from Greece who worked as a tailor while struggling to educate his children at leading universities



The former Massachusetts senator and presidential candidate, Paul Tsongas (right), was announced as the keynote speaker for the Class of '62 Forum on Policy Issues in K-12 Education. So it was not surprising when the alumni/ae, family, and friends who convened on June 6 were an enthusiastically pro-Tsongas crowd. They expected to be challenged by his views on education; his witty delivery was a bonus. Tsongas was followed by a panel of business leaders, educators, media representatives, and members of the Massachusetts Legislature, moderated by Prof. Ronald Latanision (far right, above), who painted a picture of an education system in grave need of help. When the floor was opened for questions and discussion, the line stretched from the microphone, where Hank McCarl, '62 is holding forth, clear to the back of Room 10-250.



(two uncles attended MIT). This example imprinted on Tsongas' generation the expectation that they would excel academically. "There were two banners on my wall, Harvard University and the Red Sox," he remarked. "So I had both hope and angst."

In the early 1960s, Tsongas—a self-styled Republican graduate of Dartmouth who was inspired by John Kennedy's vision—spent two years in Ethiopia, teaching high school math with the Peace Corps. The students were poor, paper and pencils were almost nonexistent, but the spirit of learning was abundant, he remembers. "These students, by American standards, had no resources. I could look down the road and see my students with their backs turned toward me, and I could recognize them by their shirts. They only had one shirt each."

"But they learned because there was a yearning to learn," said Tsongas. By contrast, he maintains, America has become a nation of affluence and contentment. "The question is, can this great nation, which has gone from a sense of working hard to affluence and comfort, go back?"

Tsongas indicted political and business leaders, teachers, and parents for allowing the flame of learning to die. He accused President Bush and office holders at state levels of "benign neglect" and a lack of courage to reform public education. He chastised teachers' unions, which he said fight any reforms that alter rules of seniority or tenure or call for performance-based compensation, even if such changes are linked to increases in educational funding. He faulted parents who "think the way you educate your kids is by buying a TV set." And he said that most U.S. corporations "do not have the community involvement and sense of giving back that some of the robber barons had."

But Tsongas was not without hope. He outlined three policy shifts that he believes would be both practical and effective:

■ At the state level, the sales tax should be increased by 1 percent, with the revenue targeted for schools. This tax would be cou-

pled with structural reforms such as merit pay for teachers and competitive evaluations of schools.

■ U.S. corporations ought to voluntarily "give back" 2 percent of their pre-tax profits to support schools and other nonprofit community organizations.

■ National political leaders, beginning with the president, must demonstrate support for a "culture of learning." Tsongas said this would mean presidential *actions* that make "the issue of learning—not earning money—the highest value in our society."

Tsongas concluded that drastic reform is necessary. Otherwise, he said, "we'll go the way of Great Britain, where you get to the top based on your lineage, not based on talent and hard work." As he left the lecture hall, the crowd rose in vigorous applause.

The second half of the morning program featured a panel assembled and moderated by Professor Ronald Latanision, chair of MIT's Council on Primary and Secondary Education. As often happens in discussions of public education, the first topic was money. Four of the panelists—Massachusetts State Representative Mark Roosevelt, State Senator Michael Barrett, attorney Martin Kaplan (who chairs the state Board of Education), and Jack Rennie, leader of the state's Business Alliance for Education—concentrated their remarks on funding issues.

Roosevelt pointed out that in this state, funding for education has been cut four years in a row. "Any revenue growth over the next five years should go to children," he said, "and the money and school reforms should go hand in hand."

But economic and demographic shifts over the last two decades have weakened support for public schools, according to Roosevelt and other panelists. "The numbers are working against us. Too few voters have kids of school age," said Barrett. "In my district—the working-class, middle-class suburb of Watertown—only 19 percent of the families include someone under age 18. Thirty-five percent of the families include someone over 65." Calling families

with children "the newest minority group," Barrett said that this population shift, coupled with the economic recession, have translated into less tax money for schools.

Kaplan echoed this appraisal, referring to a recent election in Holyoke, Mass., where citizens voted on tax increases for three separate items: trash collection, a senior citizen center, and public schools. "Trash collection and the senior center were approved; education was turned down," he reported.

Without a greater sense of urgency, Kaplan said, present trends will continue. And he believes that the only group with enough clout to light a fire under the issue of education funding is the business community. Corporations, said Kaplan, should realize that they must pay more for education, "either by retraining their future workers or by paying for schools now."

Jack Rennie, who is CEO of Pacer Systems, underscored Kaplan's point. The Massachusetts Business Alliance for Education conducted a study of current funding mechanisms for state schools, uncovering severe disparities. School districts receive 70 percent of their funds from property taxes, and 30 percent from state and federal governments. Wealthier communities—with higher property values and smaller school-aged populations—can have as much as six times the funds per public school student as have lower-income communities, the study showed.

Rennie also touched on a Tsongas theme by holding schools and teachers accountable for the educational progress of their students. But major roadblocks to accountability, he asserted, are teachers' unions and the tough tenure and seniority rules in their contracts. "A dismissed teacher can harass the system from bottom to top trying to get his or her dismissal overturned. We have to make it easier to get rid of persistently under-performing teachers."

Most of the panelists were in agreement with Rennie's critique. But unlike many forums on public education, this one included two working teachers, who pro-

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vided insight into why they and their colleagues fight so hard to retain their contractual safeguards.

"It's the only thing that protects us," said Elaine Hall, a science teacher at Quabbin Regional High School in Barre, Mass. She agreed that changes are needed to encourage teachers to improve their skills, and that teachers who have consistently poor records should be removed. But Hall emphasized that parents and school administrators often do not agree on or clearly state their expectations of teachers, and their evaluations are often capricious.

"Teachers work alone with students in a classroom," Hall remarked. "Sometimes it's word of mouth whether you are a good teacher or a bad teacher."

After nearly two hours of wide-ranging

discussion, John Hobbs, president of Jennison Associates Capital Corporation in New York City, articulated a simple vision of how volunteers can help create better public schools. "Many people have the sense that they *ought* to do something," said Hobbs. "Well, pick something and *do it*."

After investigating his own local situation, Hobbs learned that New York has a training program for assistant principals that serves as both a proving ground for prospective principals and an important route for people of color to move into high-level jobs in educational administration. One of the program leaders told him that it would be helpful if the participants could get in to see a company in order to learn management skills.

Using his business contacts, Hobbs enlist-

ed several large New York-based corporations—such as Morgan Bank and the New York Telephone Co.—to provide internships for the up-and-coming administrators. While acknowledging that public schools are quite different from businesses operated for profit, Hobbs says that a lot of private-sector management skills translate nicely: "A principal's job involves personnel management, facilities management, planning, et cetera." And besides, he adds, "the most important thing is for people in the [education] system to think that business is concerned about what they are doing." □

(The author is the coordinator of the United Youth of Boston teen newspaper and a freelance writer who writes often for the Boston Herald.)

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Jacqueline A. Casey

Presenting MIT by Design

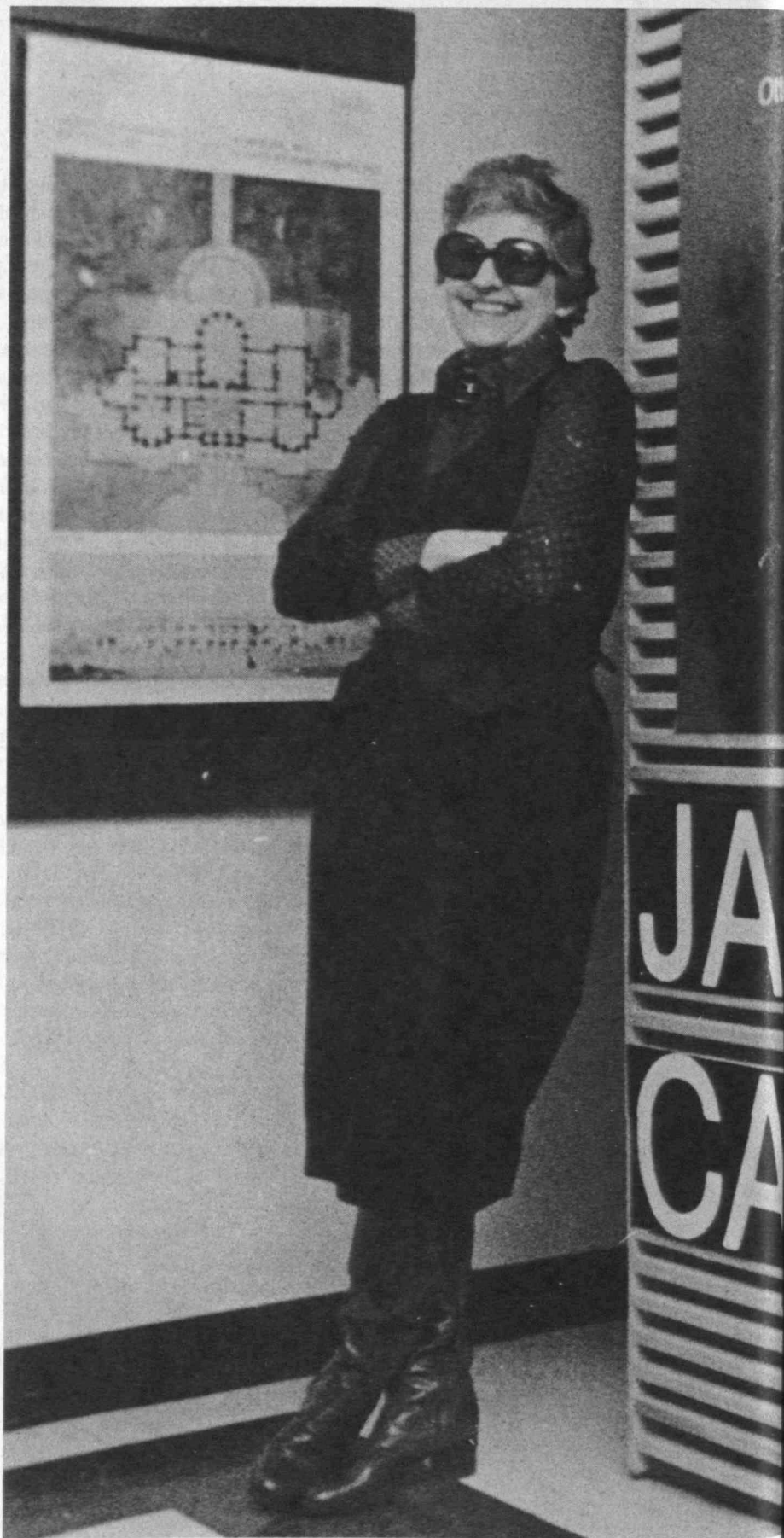
By Lisa Watts

To the long list of breakthroughs and innovations credited to MIT, graphic design may seem an unlikely addition. But by the mid-1960s, the MIT publications office was leading a design revolution in both style—embracing the pared-down, Bauhaus look popular in Europe—and concept—that a university should present itself through a distinctive graphic look.

Much of that “MIT look” could be seen in the retrospective exhibit of the work of graphic designer Jacqueline Casey. On display at MIT through September and the Montreal campus of the University of Quebec sometime next year, the exhibit features mainly the posters Casey designed for campus clients over the last three decades. Casey retired in 1989 after more than 30 years directing the Institute’s Office of Design Services; she died May 18 of cancer.

Casey’s work won recognition for MIT in the graphic arts world, which awarded her posters numerous national and international accolades. “Jackie was instrumental in putting MIT on the map as a design-conscious institution,” says Christopher Pullman, vice-president of design for Boston’s WGBH-TV. As a graphics student in the 1960s, Pullman remembers Casey as a “model of a designer with the highest standards” as well as “the only stateside practitioner of the European, avant-garde aesthetic.”

At least as important as the external praise, however, was the respect Casey won among her campus clients, who ranged from faculty and department chairs to student groups and visiting artists. She was known to spend hours in a lab or archive researching accurate



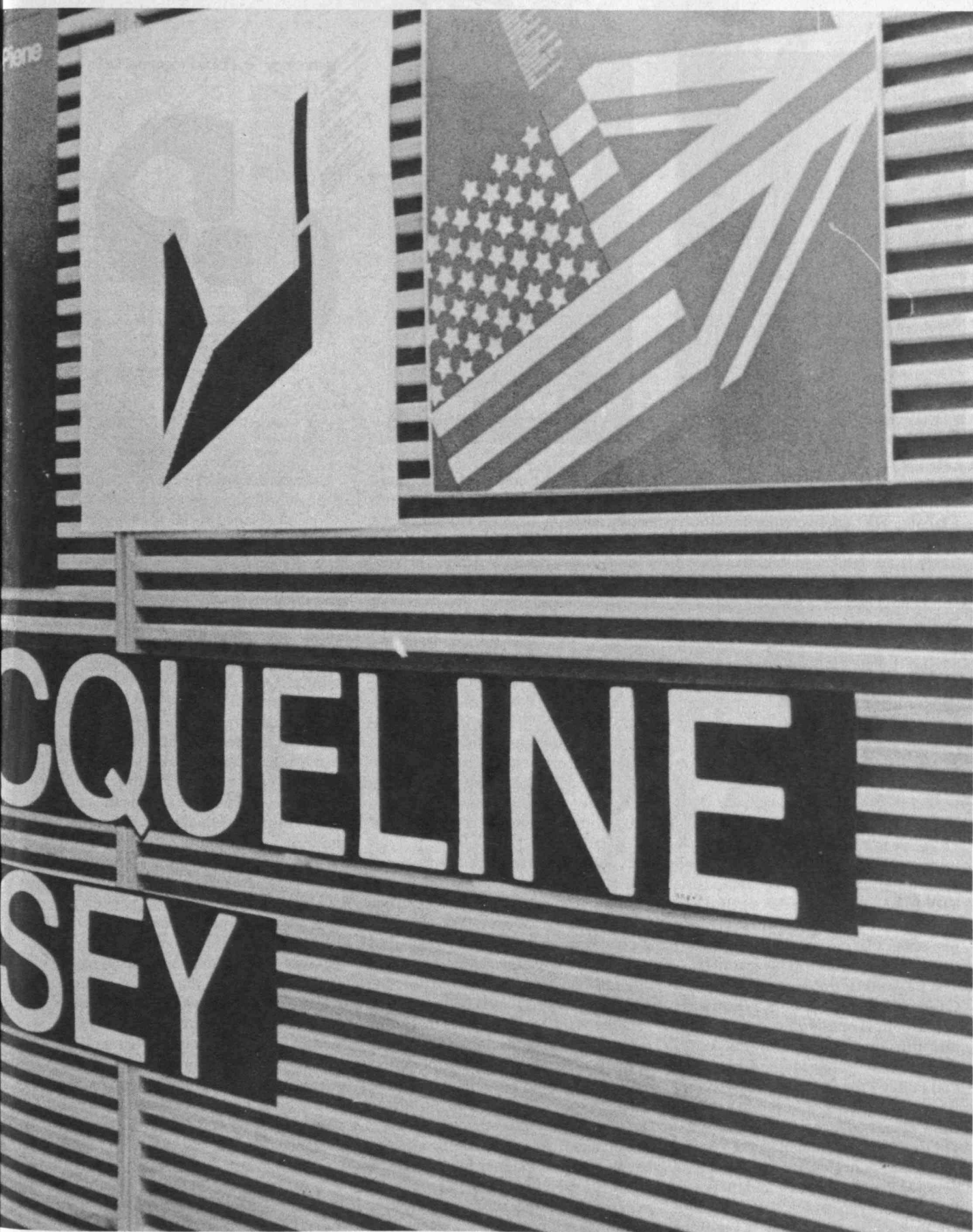
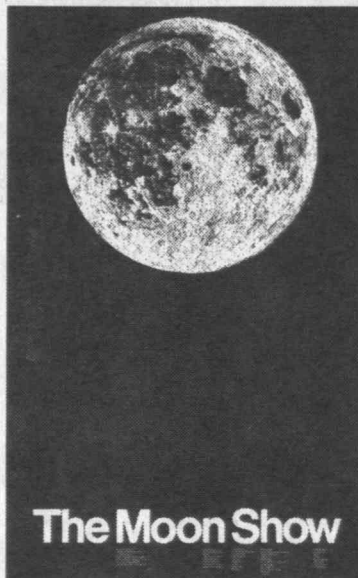
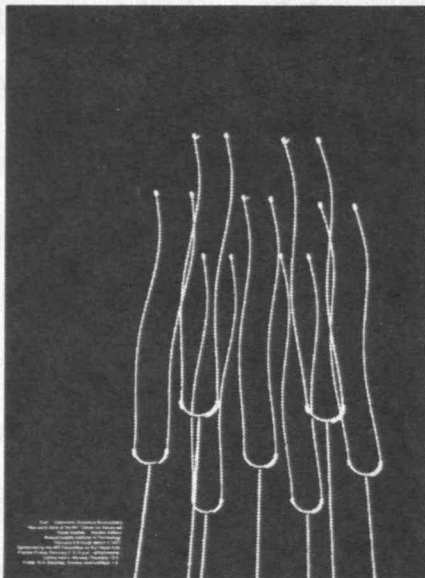


PHOTO: CALVIN CAMPBELL

Jackie A. Casey



Technology + Policy Program at MIT



images for a project. Colleagues say she stayed at MIT so long because it gave her a great deal of intellectual stimulation. "This place has so many smart people trying to accomplish something important," says one former staff member, "and that climate really mattered to Jackie."

Warren Seamans, MIT Museum director, remembers the Institute 30 years ago as "a very drab place." All corridors were painted battleship grey and any posters, welcome as they were as "splashes of color," had to measure 11 by 14 inches and hang in designated spots. The dramatically different work of Casey and her subsequent staff designers changed all that, he says.

"Jackie is almost directly responsible for design coming to be appreciated here," says Seamans. "People who have been around the Institute a long time and who come to the exhibit will say, 'Oh, I remember that poster, we hung it in our dorm room' or 'This was my favorite.'"

What makes the posters and all of Casey's work distinctive is a clean style that is both simple—often one typeface and one image—and intellectually clever. A 1975 poster for the Technology and Policy Program features two large puzzle-like pieces, suggesting a lower-case "t" and "p" for the different disciplines, ready to be joined. A 1985 poster for the Shoshin Society calling for peace between the United States and the Soviet Union features black space broken faintly by a colorless image of the globe

while "RUSSIA" is spelled out in large type at the bottom in red, with the alternating letters U, S, and A in white. For a conference on technology in developing nations, Casey researched different types of African textiles to create stylized strips of colorful Nigerian weaving, strips that form the column grid for the poster's text below.

"The best designs look effortless, but they're not," says Nancy Cahners, *Technology Review* senior designer and a protégée of Casey's. "Jackie would painstakingly work through several solutions to a project before selecting one. People would see a finished piece she had agonized over and say, 'Anyone could do that'—but they should try it. It's anything but easy!"

By the 1960s, the look Casey fostered had carried over to all printed materials at MIT, from stationery to brochures, programs, and catalogues. While a handful of corporations—among them IBM and Container Corp. of America—were beginning to pay attention to how the outside world perceived them, few universities were. Seamans notes that MIT's centralized nature lent itself to the development of such a distinctive, pervasive look. "This would never happen at Harvard," he says. "Harvard is too spread out with its disparate schools. But here is one planned, cohesive institution. Jackie, as the central designer for the central publications office, designed pieces for everyone from mechanical engineering to the performing arts."

Cahners adds that Casey's adoption of the radical Swiss style, as opposed to more embellished styles then favored, also seems "particularly appropriate to MIT, which values precision, logic, and innovation. It's hard to imagine other environments tolerating such dramatic departures from precedent." Within a decade, though, the look had become a staple of graphic design across the country.

MIT's attention to design actually took root before Casey, when Muriel Cooper was hired in 1951 as one of the first graphic designers to be employed full-time by a university publications office. Casey joined the staff as the second full-time designer in 1955. Cooper moved several years later to direct award-winning book design for the MIT Press; she now heads the Visual Language Workshop and serves as associate professor of visual studies.

Cooper sees Casey's tenure as "an era that was quite golden, and a time we'll probably never see the likes of again." The effect of Casey's work, she says, was to raise the self-esteem of a university. "It made MIT a better place. Posters like Jackie's gave this community a sense of quality, because she brought design to a consistently high level. She took what she thought MIT was and gave it back in exceptional design." □

LISA WATTS is a frequent contributor to *Technology Review*.



CLASS NOTES

07

John C. Bradley, '07, oldest graduate of MIT, died May 24, 1992. He received his bachelor's degree in physics, and having worked over the summer at the Anaconda American Brass Co. in Waterbury, Conn., while a student, returned there to work as a metallurgist for 48 years before retiring in 1955.

Just two weeks before he died, he had been adopted as an honorary member of the Class of '32 so he would not have to celebrate his 85th



John C. Bradley

Reunion alone. The idea was hatched by Richard M. Stewart, '32, a former president of American Brass, whose 60th Reunion reminded him of John, whom he had met at previous reunions. Stewart and Bradley were reunited at a ceremony at Adams House health care center where Bradley lived. The gesture meant a lot to Bradley. "Many

things John could not remember, but MIT was not one of them," wrote friend Margaret Giglio.

The year had been a full one for Bradley. In February, he had been given a certificate from the State of Connecticut designating him as its oldest resident. At a party in his honor, Bradley attributed his longevity to healthy habits and an active lifestyle. He said he never drank liquor, neither smoked nor chewed tobacco, and attended church regularly. He chopped wood and went on long hikes until he was 98 and shoveled snow at 100 from the driveway of his home.

He was a member of the Metallurgical Society of America, Independent Metallurgical Engineering of New Orleans, the American Society of Lubricating Engineers, and the American Chemical Society.

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Please send news for this column to: **Don Severance**, acting secretary, 39 Hampshire Rd., Wellesley, MA 02181

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I am very happy to report a newsy letter from **Eaton Clogher**. Most of it concerns the early adventures of him and **Paul McGreenery** before entering MIT. It gives me an opportunity to report while we are all in our 90s, we retain our sense of humor and common interest in MIT. Eaton suf-

fered a slight heart attack a little after Thanksgiving last, but has recovered and is doing well. He asked in particular to be remembered to **Bill Jones** and **Eli Berman**. Eaton has degrees both from MIT and Yale.

I am indebted to Buzz Burroughs, '20, for news about our last classmate **Marvin Pierce**, who was a member of the U.S. Seniors Golf Association.—**Max Seltzer**, secretary, 865 Central Ave., Needham, MA 02192

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Our class has done quite well considering the number of members still living.

The Alumni/ae Office has just advised us of the passing of two more '19ers, **Martha Taylor** on March 3, 1992, and **Harold C. Wells** on January 26, 1991. A memorial service was held in July in Radcliffe College's Schlesinger Library for Martha Taylor, who was an educator of problem children. She herself overcame severe dyslexia to become an editor of medical texts. She was 94 years old and a lifelong resident of Cambridge. At a certain point she became convinced that the conventional methods of dealing with young children were wrong. Accordingly she went to Columbia University and studied psychology. Later she directed children's programs for the Boston Training School as well as for Tufts and finally opening her own school in 1942. After 10 years she resumed her previous career of editing medical texts.

Miss Taylor is survived by her sister-in-law, Katherine C. Taylor, of Lexington and four cousins. She is a great credit to our Class and we are very proud of her.

We have Harold's son, Harold C. Wells, Jr., to thank for notice of his father's death. His father graduated as an architect, Course IV, with our Class. . . . We received a note written by **Francis A. Weiskittel**: "At our 90 plus years, we are a big risk, and on May 1, I developed shingles. My forehead and nose bridge are affected, also scalp. Face swollen. It is miserable." Now you know how he was when he sent me a cheery note praising our Class Notes, which he reads as soon as the *Review* is delivered to him. In a later issue we will make a proper disposition of his handling of this problem. Regards to you all.—**Bill Langille**, secretary, Box 144, Gladstone, NJ 07934, (908) 234-0690

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Please send news for this column to: **Harold Bugbee**, secretary, 313 Country Club Heights, Woburn, MA 01801

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My only news this issue is in a letter from Dorothy (Mrs. **Joseph**) **Wenick** telling of her move from Florida to 8000 Connecticut Ave., Apt. 1716,

Chevy Chase, MD 20815. Her purpose is to be nearer her son Martin, who works for the diplomatic corps. Martin speaks fluent Russian.—**Sumner Hayward**, secretary, Wellspring House, E64, Washington Ave. Ext., Albany, NY 12203; **Samuel Lunden**, assistant secretary, 6205 Via Colinita, Rancho Palos Verdes, CA 90274

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As your new secretary, I've both sad and glad news to report: One who is with us no longer and is honored in our memories is **Clifton B. Morse** who died in 1990 in California.

The happy news is that six of us made it to Cambridge this June for our 70th Reunion. We were **Yardley Chittick**, our past secretary; **Bertha Dodge**, **Bill Elmer** (who recalls with pleasure the writing of his *The Optical Design of Reflectors*, when vacationing in Florida. He is in good health and has set himself a project of living out a complete century.) Then there were **Theodore Miller**, me (**Martha Eisman** in the old days), and **Marjorie Pierce**, our treasurer.



Clockwise from upper left: Yardley Chiddick, Theodore Miller, Bill Elmer, Bertha Dodge, Marjorie Pierce, and Martha Munzer.

It is interesting to note that in 1922 we were 20 women to 2,000 men. In 1992, we were 3 and 3. What does that tell us about the female gender at MIT?

Our 70th Reunion was indeed a happy occasion. We were wine and dined, and had a delightful evening at MIT's special night at the Boston Pops. We also took time to honor our classmates who are no longer with us.

I have three more deaths to report: **E. Irving Bell** of Portland, Conn., in 1991; Professor **Charles W. Clifford** of Newtowne, Pa., on April 29, 1992. I have no further information. Lastly, **Sarah C. McCurdy**, widow of **H.W. (Mac) McCurdy**, died on May 16, 1992. Their son is mindful of the friends he made at his father's 60th Reunion; who made them all feel so welcome.—**Martha Munzer**, secretary, 4411 Tradewinds Ave. E, Lauderdale-by-the-Sea, FL 33308

23 70th Reunion

Please send news for this column to: **O.A. Almquist**, secretary, 19 Griswold Rd., Wethersfield, CT 06109

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John H. Walthall reports from Sheffield, Ala., that he is "still getting around. No problems." . . . I have received a newspaper clipping published in the *San Diego Union-Tribune* about **David Lasser**, who celebrated his 90th birthday March 20 and is starting a new project. He is working on a book about the origin of the universe.

David says, "It's a very exciting project." During the past 10 years he has compiled about 1,000 typed pages of notes from book research and expert interviews. David says it will take a year or more to organize and write the book.

Born in Baltimore, Md., to poor Russian immigrants, Lasser dropped out of high school after one semester to take a job and help support his family. David fought in World War I at age 16. Afterwards, he was accepted at MIT without completing his freshman year of high school.

After graduating from MIT, he was hired as managing editor of a science-fiction magazine, even without any editing experience. By 1929 he became convinced that space travel was possible. He wrote a nonfiction book, *The Conquest of Space*, published in 1931. Although the book received mostly ridicule, science-fiction author Arthur C. Clarke said it was "the first book in the English language to explain that space travel wasn't just fiction."

In a 1970 letter to Lasser, Clarke wrote, "Incidentally, I have just glanced through *The Conquest of Space* again and it still stands up very well. For its time it was a most impressive achievement and I congratulate you."

Lasser experienced criticism and its reversal in the political sphere as well. In 1941, with Lasser seated in the gallery of the House of Representatives, Rep. Martin Dies (D-Texas) spoke against President Franklin D. Roosevelt's proposal that Lasser run a federal training program for unemployed people. "This fellow Lasser is not only a radical, he is a crackpot," Dies said. "He is afflicted with mental delusions and thinks we can travel to the moon." Lasser was blacklisted during the McCarthy era because of his labor activities. He spent 30 years trying to clear his name. Finally, in 1980, Lasser received a letter from President Carter that said Lasser had been "treated unjustly." "I am glad that my administration has had the opportunity to correct the record in your case," Carter wrote. "Your loyal and valuable service to this country in both the public and private sectors has won you many friends and admirers. I join them in wishing you the best of luck in all your future endeavors."

I want to remind the class of **Dick Shea's** letter for March 1992. He referred to the life income funds of MIT plus the coming 70th Reunion in 1994. He is looking for someone to step forward and help organize our reunion. Any ideas coming to mind may be sent to Dick at 6501 17th Ave. West, #1-105, Bradenton, FL 34209-7800; call at (813) 798-8756.

From the Alumni/ae Association comes news of the passing of some classmates. **Jacob Lurie** died April 9, 1992. Mr. Lurie was born July 16, 1902, in the Siberian town of Minusinsk, to which his parents had been exiled by the Russian Czar for the crime of teaching Russian language to Jews. Though the family is not a religious one, they are descendants of a long line of Lithuanian Rabbis, and have traced their ancestors to Isaac Luria, the famed 16th century Kabbalist.

The family left Siberia when Mr. Lurie's father obtained employment with the Trans-Siberian Railway. They immigrated to Poland, residing in Warsaw for several years, before arriving in

Boston in 1911. After growing up in Boston, Mr. Lurie was educated in chemistry at Harvard and MIT. He worked for the Monsanto Chemical firm and in 1950 formed his own firm, The Lurie Chemical Co., in Plainfield, N.J. Mr. Lurie operated this company until his retirement and later moved to Colorado. He married Elsie in 1927.

Jacob Lurie was active with the American Chemical Society and the alumni associations of Harvard and MIT. He is survived by his wife, Elsie, of Denver, a daughter, son, five grandchildren, and six great-grandchildren. The family suggests that memorial contributions be made to the Whittaker Health Sciences Fund, Bldg. E-25, Rm. 501, 45 Carleton St., Cambridge, MA 02142.

The Alumni/ae Association has discovered that **Stanley T. Cook** passed away December 31, 1990. His home address was 3474 Northlake Dr. NE, Grand Rapids, MI 49505-2709. This is all the information that was passed on to me. If anyone would like to send me news of Stanley Cook I will be glad to include that in a future report.

Samuel J. Helfman died April 26, 1990. His address was 26381 Wax Rd., Denham Springs, La. He is survived by his wife, Louise E. (Helfman) Jensen. Our condolences to her.

Harry G. Burks, Jr., passed away April 8, 1992, at the Meadow Lakes Retirement Community in Hightstown, N.J. after a short illness. A longtime resident of Hillside, N.J., and Madison, Conn., he was 92 years old.

After 40 years with Standard Oil Co. Dr. Burks retired as coordinator of worldwide refining operations in 1964. He joined the company in 1924 as a development engineer at the Bayway, N.J., refinery, and became general manager for east coast manufacturing operations in 1943 and executive VP in 1949, before being promoted to the refining coordinator's post in 1954. He was from Bedford, Va., and graduated Phi Beta Kappa from the University of Virginia and earned a doctorate in physical chemistry from MIT.

In World War II, the Petroleum Administration for War appointed him chairman of the Aviation Gasoline Advisory Committee, which was responsible for increasing the production of high-octane fuel for the Allied Air Forces. Dr. Burks is survived by his wife of 63 years, the former Catherine Parnelle, three sons, a sister, nine grandchildren and 10 great-grandchildren. Our sympathy to all the family.—Co-secretaries: **Katty Hereford**, Box 5297, Carmel, CA 93921; **Col. I. Henry Stern**, 2840 S. Ocean, #514, Palm Beach, FL 33480

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Stanley Lane continues active and happy in Surry, Maine, according to his brother Norman, '29. . . **Archer Nickerson** writes from Duxbury, Mass., that he appreciates hearing about classmates as reported in the class notes. . . A note from **Bill Herbert** in Houston, Tex., indicates that 1992 has been a good year and that he feels ready for the 1995 reunion. Bill went to Florida in June to visit his sister and other relatives.

Fred Greer, despite his extremely poor eyesight, writes that he and Eleanor celebrated their 67th wedding anniversary July 18. Fred will be 90 in September—an age that most classmates are fast approaching. Fred also reports that his patents, which led to the formation of the Wire Belt Co. of America, have expired but the plants in New Hampshire and England are doing well.

It is with sorrow that we must report the passing of three classmates. . . **John E. Black** died in Clearwater, Fla., on February 2, 1992. For many years John was a manufacturing consultant working out of Bristol, Tenn. . . **Alexander J. Rokicki** passed away in Delmar, N.Y. March 29, 1992. He spent most of his working life with the New York Telephone Co. He is survived by his wife, Betty. . . **Francis C. Foss** died May 7, 1992, in the Medical Center Hospital of Vermont in Westford. Following graduation Frank lived in Norwood, Mass. In 1932, he moved to Cranston, R.I., where he joined

the Beneficent Congregational Church in Providence, serving as a deacon and a member of the choir. He sang lead tenor with the University Glee Club until 1971 and also sang under the direction of Arthur Fiedler of the Boston Pops. While in Cranston he served on the city council from 1948 to 1956. During his working years in Vermont, he was employed by several companies in a variety of engineering capacities. He is survived by his wife of 64 years, Ruth (Welch) Foss, a son and a daughter, six grandchildren, and five great-grandchildren.—**F. Leroy (Doc) Foster**, secretary, 434 Old Comers Rd., P.O. Box 331, North Chatham, MA 02650

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I'd hate to think that no one in the Class of '26 is doing anything except dying, but I'm afraid that's all I have to report at this time. I know something must be happening in your lives that would be of interest to others, so jot down a few lines and send them to me so we'll have news for the next issue.

Albert L. Entwistle of Louisville, Ky., died February 6, 1992. No other information is available. . . **Stanton L. West** of St. Petersburg, Fla., died in 1991. No additional information is available.

We now have more information about **Robert W. Conly** of Kennett Square, Pa., who died March 18, 1992. Conly retired in 1967 as senior vice-president of AETNA Life & Casualty in Hartford, Conn., after 40 years of service. He was a member of the Lower Brandywine Presbyterian Church, Wilmington, Del., Rotary International, the Highlands Park Club of Lake Wales, Fla., the board of the Hartford YMCA, and was an enthusiastic gardener. Survivors include his wife, Ruth, two sons, and four grandchildren.

Please send news to: **Donald S. Cunningham**, secretary, Eventide, 215 Adams St., Quincy, MA 02169, (617) 328-1840

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Attending our 65th Reunion were a scattering from all over the U.S. **Charles T. "Tom" Barker**, Rancho Cordova, Calif.; **Joseph Burley**, secretary, Delray Beach, Fla.; **Margaret and Robert DeLuccia**, Lake Oswego, Oreg.; **Arthur Connolly**, Wilmington, Del.; **John Driske**, Capital Gift secretary, Easton, Pa.; **Janet and Harold "Bud" Fisher**, president, Duxbury, Mass.; **Lawrence Grew**, assistant secretary, Branford, Conn.; **Richard Hawkins**, class agent, Hingham, Mass.; **Maurice James**, Milwaukee, Wis., and Northwood, N.H.; **Betty and Edward Leach**, Springfield, Ill.; **Lt. Col. Jerome Spurr**, Wellesley Hills, Mass.; and **Cecil and Ezra Stevens**, Westwood, Mass. Professor **Kenneth Smith**, Issaquah, Wash., had made reservations but didn't make it. Mrs. **Harold Heins**, Marblehead, Mass., attended our class dinner.

We first gathered at a reception and dinner at McCormack Hall with the Class of 1932 including after-dinner singing and performance of the United Brass Quintet.

On Thursday a.m. with assistance of Alumni/ae Association guides, we joined a Class of 1947 sponsored panel discussion, "Technology and the Media," with Moderator Steven Marcus, editor of the *Review* and four good speakers including **Stuart Diamond**, former science reporter for the *New York Times* and **Paula Aspell**, executive director, NOVA TV programs. Lunch was held at the EG&G Building with the Class of 1932 followed by a talk with **Claude Brenner**, '47. We then followed the Technology Day program with a great Pops concert in the evening. Friday was a full day of events as is customary.

The Memorial Service included 19 members of 1927. The MIT luncheon was the occasion of our biggest moment as our class gift was announced of \$8.6 million, a record for any 65th Reunion. The majority of our gift was from the bequest of

Harold "Doc" Edgerton with a high percentage of our class participating. Our 65th closed with a class dinner at the Faculty Club with President and Mrs. Vest joining us along with Dan Watt of the Association. The class officers were reelected with applause.

We can be proud to have lived through these 85 years in a tumultuous and productive century. With a jump start from MIT, we have contributed our share in a wide diversity of companies and endeavors.

Some of us can remember the many previous Reunions together with this listing of locations: 5th, Mayflower Hotel, Plymouth; 10th, Ye Castle Inn, Saybrook; 15th, Hotel Griswold, New London; 20th, East Bay Lodge, Osterville; 25th, 30, 35th, Oyster Harbors Club, Osterville; 40th, 45th, Bald Peak Colony Club, Melvin Village, N.H.; 50th, 55th, Wianno Club, Osterville; 60th, Cambridge and Marblehead.—**Joseph C. Burley**, secretary, Isle of Springs, ME 04549; **Lawrence B. Grew**, assistant secretary, 21 Yowago Ave., Branford, CT 06405

28 65th Reunion

This last year before our 65th Reunion is well under way, as well as plans for celebration of that event in Cambridge in June 1993.

Newsworthy activities of members of our class have been scarce, except for death announcements which surely cannot be the predominant reason for this lack of chatter.

Harold Lewis Geiger died on April 18, 1992, after an occupational lifetime in metallurgy. . . . **Armand Malcolm Morgan** passed away on April 25, 1992, a Rear Admiral USN with a career in submarine and ship design and construction. . . . **Willis G. McGown** died on May 6, 1992. . . . Lastly, **Harold Fulton Porter** died on March 25, 1992. It is hoped that at least one of the many classic early vintage cars that Harold had lovingly restored was involved in his last ride. The Class offers sincere condolences to family and friends and honors their lifetimes and accomplishments.

Miriam and Clifford Terry toured Yugoslavia in 1990 shortly before its violent breakdown. In 1991, their visit to Russia ended two weeks before the coup that terminated Russian dominance of the Soviet Union. Since their leaving China in April of this year, what might be about to happen in that distressed nation? We could caution the Terrys about visiting Washington in 1993.—**Ernest H. Knight**, secretary, Box 98, Raymond, ME 04071; **Hermion S. Swartz**, reunion chairman, 12 Minola Rd., Lexington, MA 02173

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I received a letter, dated May 27, 1992, from Alan G. Reddig, the son of our classmate, **James C. Reddig** of Webster, N.Y., giving a report on his father's physical condition. "Unfortunately, my father has been in ailing health for the past year, with what the doctors refer to as 'stroke-like' symptoms—physical weakness, disorientation, and the loss of short-term memory. He underwent extensive open-heart surgery three years ago, and although he made a significant recovery from the surgery itself, his mental condition has declined steadily since then. He has lost his once considerable gift for writing and now has difficulty concentrating on and comprehending reading material. And, most sadly, he is no longer able to travel, as he loved to do. He continues to live in his home of 40 years (which he designed) in Webster, N.Y., with the assistance of a full-time personal health aide. His children are determined that he should continue to live in his own home as long as possible. My father has practically lost his ability to read and write, but I am able to read correspondence aloud to him with reasonable success. Although it is impossible for him to respond per-

sonally, I think he would enjoy hearing from friends from MIT days, and I don't think he would mind if his situation was passed along to his classmates, many of whom may have been wondering why his stream of letters has dried up."

Jim attended our 60th Reunion at MIT Campus and I had occasion to spend some time with him in between activities. One of his closest friends and classmate, **Paul S. Baker**, and wife Kay were also present and Jim enjoyed being with them. At parting time, he turned to me and asked me if Paul and Kay had gone yet. I told him, "they are still here." He remarked sadly, "I want to say goodbye to them, as I may never see them again."

Professor **Fred S. Eastman**, wife Louise, of Medford, Ore., writes: "Life in this big retirement mansion is very pleasant, I seem to have developed a little hearing and vision problem lately, so we substitute bus rides and tours for our own car when a relative who likes to drive the beautiful country roads in Oregon and northern California visits us. In good weather, I lead a small group of walkers. Our favorite walk is on the bicycle trail along Bear Creek. This gives us a mile and a half walk to our favorite restaurant for breakfast and a mile and a half return via a different route. Yes! Life is great here and I am very fortunate."

I had a telephone call from **E. Neal Wells**, wife Helen, of Pinellas Park, Fla., who informed me that his health has improved somewhat and his wife Helen is well. Their grandson got married a short while ago and they were disappointed they were unable to attend because it was out of state and the trip would have been too much. Neal sounded very good compared with his condition during the 60th Reunion. His son and grandson had brought him to MIT Campus. . . . **Chung F. Yee** and wife, Zai Chen, of Worcester, Mass., write, "We are enjoying our retirement life here. We take walks in the afternoons, I enjoy reading and listening to music on TV. I would like to extend my good wishes and happiness to all our classmates in their golden retirement days."

Robert S. Riley, wife Margaret, have moved into a Health Care Center, 316 Dogwood, East Hill Woods, Southbury, CT 06488-1384. They spend their summers in their seashore cottage in Weekapaug, R.I. . . . **Hunter Rouse** and wife, Doi, of Sun City, Ariz., write, "If I am not mistaken, I now owe you three letters, one of which is in response to the birthday card, which as usual arrived right on time. Doi and I are glad to know that you and Helen are behaving better this year than last. We appreciate your advice about acting our age, so we stay at home in spite of grandchildren's weddings in various parts of the country. We too have a great-grandchild about the same age as yours, but we manage to see her without extra travel."

. . . **Louis Southerland**, wife Jeanie, of Austin, Tex., writes, "I am, of course, retired, but I am moving my personal business office back to that of my firm, Page, Southerland, Page, Architects & Engineers, which I co-founded with the late Louis Page in April 1931 in Austin. I am proud to say that the firm is doing quite well in spite of the recession. As to travel, we had an early spring trip to San Miguel, Mexico—delightful. A trip to the Provence area of France is planned for September. We expect to see you on our 65th Reunion." His hobbies include watercolor painting, hunting quail, fishing, and traveling.

Harold M. Weddle, wife Esther, of San Diego, Calif., writes: "We are still able to visit annually our two sons and their families—one is in Chappqua, N.Y., and the other in Helena, Montana. We also visit our home town and relatives in Kansas." . . . Professor **John Happel**, wife Dorothy, of Hastings on Hudson, N.Y., writes, "We do not have any grandchildren yet. . . . However, our youngest daughter Ruth was married on March 28th. They have a house in the vicinity of Chapel Hill, N.C., where the wedding occurred. We were blessed by beautiful spring weather. Dottie is busy with music during this Easter season. This morning at the Palm Sunday service she played a violin solo from Beethoven's *Missa Solemnis*. As for me, I keep busy on more prosaic chemi-

cal engineering problems at the Rockefeller University, a third edition of my chemical process economics textbook co-authored with a professor from Villanova, and a process for 4P-grading natural gas with one of my former doctoral students. I also find walking an hour or two every day is great for my health. In the summer we spend a couple of months at Lake Placid where Dottie is concertmaster in the Sinfonietta. I have climbed all the high peaks in the Adirondacks, but these days I am more of a foothills mountaineer."

I regret to announce the death of the following members of our class: **Leonard C. Peskin** of Wyncote, Pa., on July 12, 1991; **Edwin R. Gardner**, Pinellis Park, Fla., on April 15, 1992; **Robert E. Jackson**, Marblehead, Mass., on May 3, 1992; and **Lawrence A. Horan**, N. Chatham, Mass., on May 8, 1992.—**Karnig S. Dinjian**, secretary, P.O. Box 83, Arlington, MA 02174 (617) 643-8364, (603) 926-5363

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As previously reported, **Bill Perret** is apparently the only member of our Class that was born on February 29th; thus 1992 was a landmark year for him. He says, "On February 29 I celebrated my 21st birthday so I now have the doubtful privilege of voting! For those who congratulated me on my 84th birthday, my response was: 'Thanks, but I doubt that I'll be around in 2254 to enjoy it.'" Bill had a stroke in May 1991 that impaired his right side, but seems to have learned how to live with his disability. He says, "I've been awed by the number of everyday things that can be accomplished with only one hand. . . . I can prune shrubs with hand shears and a pruning saw but lopping shears have so far defeated me." The Perrets live in Albuquerque and have a trailer on a ranch near Deming, N.M., where they stay occasionally for a couple of weeks.

As of mid-1989 **Herb Wampner** was leading an exceptionally active life, teaching five courses in computer programming at two senior centers and giving photo slide shows at several centers. He has now slowed down a bit, but is still quite active. Thus he has given up teaching but still acts as a "counselor" for computer novices. Also he is active in a California social organization called SIRS (Sons in Retirement) that has 163 branches with a total membership of 33,800. Herb maintains a 16-item data base of the members of his branch that provides information for publication of the organization's annual roster. He has recently moved to the Sunny View Lutheran Home in Cupertino, Calif., a retirement community that he describes in glowing terms. . . . **Bill Waite** reports having had major surgery in the latter part of 1989 but seems to have largely recovered as evidenced by the following excerpt from his 5/22/92 letter: "At 6 a.m. tomorrow Peg and I depart for Montpelier, Vt. On Tuesday we dance with a live nine-piece senior citizens' band, and we will return to Delaware by June 1. Peg does most of the driving. Her eyes and ears are very much better than mine!"

The rest of the news at hand is unfortunately unrelievedly downbeat. **Alfred Carideo's** wife, Delia, writes that Al "had a massive stroke last August (1991) and is partially paralyzed. He is now in a nursing home as he requires skilled nursing care."

Notices have come in concerning the deaths of five more classmates: **Mahlon Bragdon** and **Fred Ladd** in 1991, **Homer Davis** last February 28, **Myron Falk** on April 26, and **Leonard Goodhue** on April 27. My records indicate that I have never heard from Bragdon and hence I have no information about him other than that he was a longtime resident of Natick, Mass. . . . Like a number of others who started with our Class in the fall of '26, **Homer Davis** dropped out of MIT for a time; he received his degree in electrical engineering in 1932. Specifically, he left MIT at the end of his junior year and worked for the Long Lines Department of AT&T for two years. After gradu-

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ating in 1932, he worked briefly for Bethlehem Shipbuilding Corp. and then began an active duty military career in 1940 which ended when he retired in 1963 as a colonel with a Legion of Merit award. For the next 10 years he worked as the electrical superintendent of Stanford University before finally retiring. He is survived by his wife, Dorothy; two daughters, a son, three grandchildren, and one great grandchild.

The only information I have on Myron S. (Johnny) Falk comes from a N.Y. Times obituary that describes him as an "investment banker, philanthropist and prominent collector of Asian art." He was a longtime trustee of the Asia Society and also served as a director of the New York Foundation and Hebrew Technical Institute, a member of the Federation of Jewish Philanthropies, and chairman of the Bennington College board of trustees. He is survived by his wife, Pauline; two daughters, a son, and six grandchildren. . . . The rather sketchy information I have on Leonard Goodhue indicates that he worked for the Dewey and Almy Division of W.R. Grace & Co. As of 1987 he reported that he was living alone in Winchester, Mass., and that his "family" comprised five nieces and nephews and their children and grandchildren. . . .

Like Homer Davis, Freddie Ladd started with our Class in 1926, but was forced to drop out for a while and received his degree in 1933. The information I have about him came mostly from Yicka Herbert who was a member of the track team of which Freddie was captain. Freddie spent almost the entire four years with us; it wasn't until May 1930 that he was forced to leave MIT because of both the death of his mother and his own illness. After graduation he worked for Raytheon for 27 years, retiring in 1970. At Raytheon he worked on guided missile systems. After his retirement he moved to Leesburg, Fla., where he was living at the time of his death. He was active in Masonic affairs both in Massachusetts and Florida. He is survived by his wife, Margery, a son, two daughters, eight grandchildren, and three great grandchildren.—Gordon K. Lister, secretary, 294-B Heritage Village, Southbury, CT 06488

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Please send news for this column to: **Wyman Boynton**, secretary, 668 Middle St., Portsmouth, NH 03801

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Our 60th Reunion arrived! The weather was excellent. Our classmates were cheerful. The opening reception was an informal dinner with entertainment by the United Brass Quintet. An after dinner songfest was led by **Thomas Weston** and **George Falk**. A citation was given to our Reunion Chairman, **Tom Weston** and his wife Rose, who so ably assisted him. A bronze plaque was given to **Melvin Castleman** for his 15 years of service as class secretary.

Thursday was a busy day! There was a memorabilia room where many pictures of classmates were displayed. Among other items to be seen were books authored by our classmates, and the shell sculpture works by **Jacob Millman**.

The luncheon was in the Grier Room. We listened to a presentation by **Claude Brenner**, '47, entitled "Unprofound Reflections on Profound Subjects." It was a delightful witty collection of poems and comments that have not yet received the literary magazines' attention that they merited.

In the evening, after a pre-Pops dinner, there was the popular Boston Pops concert replete with MIT songs.

Friday morning began with a memorial service at the MIT Chapel. Those members of the class of 1932 that were reported as deceased in the past year were as follows: **Katherine S. Burrows**, **Robert B. Freeman**, **Rene G. Hochreutiner**, **Max Katz**,

Robert C. Kennedy, **Richard A. Lobban**, **Jacob Millman**, **Joseph B. Smith**, **Halsted R. Warrick**, **Donald Whiston**, and **Lawrence W. Whitaker**.

At the Technology Day luncheon, **Wendell Bearce**, our Reunion Gift Chairman and **Ed McLaughlin**, our Class Agent, announced our class gift of \$2.4 million. At the proper moment **Tom Weston** had our class rise, rub our special 60th Reunion badge, which would then twinkle brilliantly, and we sang "Our Class Will Shine Tonight." The day was full of interesting lectures, centered on the theme, "Winds of Change for American Business."

Friday evening our class met in a private dining room at the Faculty Club. After dinner **Frank Gowen**, chairman of the nominating committee, presented a slate for the next five years: **John Brown**, president; **Wendell Bearce**, vice-president; **Thomas Weston**, vice-president; **Melvin Castleman**, secretary; **Donald Brookfield**, assistant secretary; **Arthur Marshall**, treasurer. The slate was accepted unanimously. **John Brown** expressed thanks to the Alumni/ae Association for its help in keeping the reunion operating smoothly with special thanks to **Nancie Barber** who worked closely and effectively with the Reunion Committee.

John Brown also wanted to thank the two widows **Mrs. Donald Gilman** and **Mrs. John Finnerty** for attending our reunion—and helped to remind us of our former friendships and associations.

After the class meeting, an "open mike" session was held. We called it "Reflections of Octogenarians." **Arthur Marshall**, **Donald Brookfield**, **Harry Johnson**, and **Manly St. Dennis** spoke about their early years and how they got started on their careers. **John Northrup** also gave us some sound advice on coping with our advancing years.

After three quarters of an hour we might have kept going, but we decided not to keep our returning bus waiting—and tomorrow, Saturday, would be a busy day.

On Saturday we bused to Salem, lunched at the Peabody Museum, where on the tour we saw evidence of Salem in the height of its glory as the center of America's travels with the wide world during the 1800's. Then we went to the Salem Witch Museum where we vividly witnessed (through 13 life-sized stage settings with sound effects) Salem in the depths of the witch hysteria (1692). In the evening we went to Anthony's Harbour Pier Four for the famous lobster dinner.

Sunday, those of us remaining gathered around the long tables for brunch. We reminisced, expressed hope of getting together in two or three years, and then bid farewell to each other.—**Melvin Castleman**, secretary, 163 Beach Bluff Ave., Swampscott, MA 01907

Editor's Note: Please see '07, page MIT 19, for the obituary of **John C. Bradley**, honorary member of the Class of 1932.

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60th Reunion

Bill Houston reports from 1730 Lauren Ln., Orange Blossom Gardens, Lady Lake, FL 32159-2127, that he has checked the Sheraton-Tara Resort Hotel, where we are going to be for our 60th, and finds it splendid.

Mal Masters' lifelong partner, **Claire**, writes that he is still very active and too busy to write letters. She enclosed an article from the *Biking Magazine of New England*. **Mal** used to caddy at the Mt. Washington Hotel, and met his wife, **Claire**, 58 years ago at a YMCA dance. He is long retired as director of systems operations at Boston Edison, and his avocation is obviously the outdoors, particularly mountain trails, of which he has opened more than one, as well as biking.

Larry Parsegian, bless his heart, returned to Armenia, 76 years after he fled, to repay a debt, and reports: "The Armenian people feel lost. The mental state to which they have been reduced by communism is difficult for us to comprehend. They haven't yet realized that the country is

theirs." In their luggage, the group carried 140 pounds of vegetable seeds supplied by the American the Beautiful Fund. Their first mission was to help the State Engineering University of Armenia in Yerevan organize a program in environmental engineering.

Burt Webster experienced some ticker trouble in April or May and would be pleased to hear from any of you ladies or gents at 297 Holdenwood Road, Concord, MA 01742.

Charlie Britton was shanghaied into the position of acting treasurer and, bless his heart, agreed to assume the responsibility—we presumably will rehire or fire him at the 60th Reunion. The only speeding ticket he ever got was in the mid '30s on the Wellesley campus, the alma mater of my dear late wife, Peggy.

Presumably, some of you people attended Tech Day in June and will report to yours truly so I can reproduce same in the next issue.

Mort Williams, 1309 Jefferson Ave., Pasadena, TX 77502, is trying to locate **Dave McIntire** and **Herb Larrabee**. He would appreciate any word. He has in recent years contacted Tom McLaren, '30, Al Sims, '31, Mason "Sam" Burrows, '31, **Clare Farr**, **Bob Smith**, **Bill Kilbourn**, and **George Manter**, '31.

Walt Skees, our Barcelona rep., hopes some classmates will be in Barcelona for the 500th Reunion of the trip of one Columbus. If anyone is so situated, will you please let the rest of the class know through your secretary.

Obits. **Charles E. Quick** died October 26, 1990. His widow can be reached at 10894 Bayside Dr., Traverse City, MI 49684. Charlie was a member of Scabbard & Blade. . . . **James P. Warbasse, Jr.** passed away March 29, 1992. He attended Yale, MIT, and was a graduate of what is now the New York State University Downstate Medical Center. He also got an M.S. from the University of Pennsylvania and was on the staff of St. Luke's in New Bedford for 47 years. His widow, Gertrude, is at 26 Water St., Apt. 202, New Bedford, MA 02740. . . .

Cole A. Allen of Honeoye Falls, N.Y., passed away April 15, 1992. Survivors unknown.

Hugh W. MacDonald, a retired U.S. Army colonel (1933-63) died April 29, 1992. He was a naval architect and research director for Davison Laboratory of Stevens Institute of Technology for 30 years. . . . **Robert Wellwood**, survivors unknown, passed away May 15, 1992. . . . **Gardner Harvey**, survivors unknown, passed away February 23, 1991.—**William B. Klee**, secretary, Box 7725, Hilton Head Island, SC 29938

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Please send news for this column to: **Robert Franklin**, secretary, Box 1147, Brewster, MA 02631; **George Bull**, assistant secretary, 4601 N. Park Ave., Chevy Chase, MD 20815

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Back in 1984 **Jefferson (Jeff) Farmer** and his wife Christine left New Hampshire for Mountain Home, Ark., at the urging of their daughter and her husband, who had set up a practice in that Ozark county. Jeff writes that they enjoy the mild weather after all the ice and snow. They now have a never tiring view across Lake Norfolk and the surrounding hills. Jeff says they have enough land to give him "an excuse to have a good tractor and an Arkansas limousine (pickup truck) with which to keep physically active." They have managed to make several visits to New England to keep up on family activities, as well as visiting their favorite tour spot, Bermuda. Jeff was **Bernie Nelson's** best man and was also with him in Washington when his first daughter was born. On his way home from India, Jeff was met by Bernie in Cairo and gave him "a fine local tour." Bernie and Jeff were fraternity brothers at BTP.

Leslie J. Fitz Gibbon writes from his home in Garden City, N.Y., that he spends a lot of time as a USTA volunteer. Les is on the Davis Cup and Olympic Committees and has been director of the USTA Information Booth at the U.S. Open for the past 26 years. Since 1979 he has been captain of the USTA Britannia Cup Team which is an International Team Competition for men over 65. This year they played in Seefeld, Austria, in May. Les has been to Wimbledon every year since 1965 when his son, Herb, played there. He invites us to stop by at the U.S. Open and say hello—he is the guy with the coconut straw hat in the Information Booth.

This note from **Rollin D. Morse**, written from his home in Columbia, Pa., will surely awaken memories: "After three years of widowhood I am preparing to marry a long-time neighbor and friend, to begin a new period of married bliss. Had to move away for four months to persuade her that 'absense makes the heart grow fonder.' Our computers provided a new avenue of romance, that resulted in her acceptance of my proposal."

A short note from **Richard F. Jarrell** states that he is still active two days a week consulting to Thermo Jarrell-Ash, now located in Franklin, Mass., advising about spectrochemical analysis of unusual types of materials.

I regret to report the deaths of four of our '35ers: **Lee A. Reid** on June 20, 1991, **Frederick C. Draemel** on August 14, 1991, **Jeb S. Darby, Jr.**, in February 1992; and **William J. Bates** on March 28, 1992. The only information I have of Lee Reid is that he was living in Pasadena, Calif. . . . **Frederick Draemel** started with Tidewater Oil after receiving a master's degree in 1936. Between our 25th and 50th reunions he moved over to Phillips Petroleum Co. where he was assist chief process engineer. He is survived by his wife, Edith, two sons, a daughter and five grandchildren. He lived in Concord, Calif. . . . **Jeb Darby** joined Cutler-Hammer in Milwaukee as sales engineer and retired as administrative assistant to the president in 1967 and moved to Austin, Tex. He moved to Houston in March 1991 where he died after a long illness. He is survived by his sister, Mrs. Shaw Cranfield. He never married. . . . **William Bates** died at his home in Pittsburgh after a long illness. He was associated with the U.S. Steel Corp. for 40 years beginning in 1939 and was director of administrative services and assistant to the VP of marketing. He was active in his own management consulting firm doing industrial market research in the United States, Mexico, and Barbados and recruiting for International Executive Service Corps., Mexico. He played the full 25 years in our Class Golf Tournament and I played with him at his home course several times. He is survived by his wife, Ellen Culberston Bates, living at 9A, Gateway Towers, Pittsburgh, PA 15222, two married daughters, one son, and six grandchildren. I am sending the condolences of all classmates to the surviving family members.

I am in the process of planning my bi-annual visit to New England to visit my children, nine grandchildren (includes one grandson), sister, and friends in October. Please keep the news coming.—**Allan Q. Mowatt**, secretary, 715 N. Broadway #257, Escondido, CA 92025-1880

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On the way from New Jersey to a grandson's May 17 graduation from BU, I visited **Augie Mackro**, **Felix Klock**, and President **Alice Kimball** in Connecticut, and **George Schmalz** and **Vince Estabrook** in Massachusetts. On the return trip, after a stop overnight with the **Bordens**, I saw **Tom Johnson**, **Karl Gelpke**, **Lee Tolman**, and **Ariel Thomas**. Preliminary telephone calls to several other classmates were not answered, but perhaps better luck next year, when another grandson graduates. Augie's son Jay was MIT '71, with an SM in '72, and MBA Stanford '77. Augie hoped

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Jay would return to take over the business, but he liked the West too much. Augie is a super-amateur radio operator, with connections over much of the western hemisphere, Europe, and eastern Asia via a satellite built by the world's amateurs and lofted by Ariane. Wife Virginia keeps fit in winter for summer golf by "line dancing" in a senior citizen's group.

Felix Klock started with '35 but finished with us after a one-year hiatus in California for health, and a term at Stanford. In Course III, metallurgy, he recalls **Lew Gelbert** and **John Pappas**. He married Nancy Overton of the Class of '37, and their son Peter graduated in 1965—a rather unique Tech family. Both Felix and Nancy worked in the propeller division of Pratt & Whitney, and as jet engines made blade durability more crucial, Felix started his own metallurgical business. He introduced a process of heat treatment at a low dew point, preventing "poisoning" of stainless steel, when normal treatment robbed the surface of its chromium. Felix sold the business to Gulf & Western in 1957, but continued as president until 1985, and gave a batch of G&W stock to the Alumni/ae Fund to provide income for poor students. Nancy died in 1981.

Alice Kimball had "campered" down to the Carolinas where she saw Doris and **Towers Doggett** at Edisto Island. At this writing Alice is on a windjammer cruise off the New England coast. . . . **George Schmalz**, Course XV, was with American Steel & Wire in Worcester until it closed about 1960. He retired from Dennison Manufacturing in 1980, joined wife Barbara in volunteer work at Worcester Hospital, and continues, following her death in 1984. George plays bridge thrice weekly with the Cavendish Club, whose 200 members voted him man-of-the-year in 1988. My visit coincided with an annual family get-together—his daughter, three nieces, and their husbands spent a weekend refurbishing the homestead inside and out. And what a jolly crew they are!

Vince Estabrook, Course XV, returned to the Institute to work with Professor Wyman Fiske and get an SM in 1939. Then, joining investment counselors Standish, Ayer & Wood with knowledge of the chemical and oil business (he was originally in Course V), he prospered to director and vice-president. One of his fields was appraisal of unlisted stocks. He retired in 1982, and also is a retired colonel in the Army Reserve. Vince's longtime Masonic interests have included a trusteeship of the Grand Lodge and director of the Massachusetts Masonic Home for 160 residents.

Kitty and Herb Borden have expanded and remodeled their vacation home a few miles beyond Cape Cod Canal, and I enjoyed a very comfortable guest suite. They knew each other in high school; she went on to Simmons, and they married as Herb was finishing chemical engineering Practice School for an SM in 1939. On leave from Arthur D. Little through the war (army major), he went back to Taunton in 1945 to close up the grain business of his father, recently deceased. But it took a long time, 35 years or so, because they like Taunton, as his 50th Reunion biography attests. More on this trip in the next issue.

A letter from **Roman Ulans** (Course VI) tells of his return April 26–May 1, this time with wife, Morwenna, and their six children, to the city of Lvov and two villages in the Ukraine. Ro was there in 1976 as director of the European office of Communications Satellite Corp. in preparation for the 1980 Olympics in Moscow. Now, speaking the Ukrainian language, he found "an uplift of public morale from the cessation of long repression. Easter (April 26 in Russia) was the first religious celebration in many years, and was officially marked by a three-day national holiday, with churches packed beyond comfort and much larger numbers outside listening to loud speakers. Everyone is aware that hardships will worsen before they improve as experience is gained in creating a market economy. But, my overall impression is one of hope, if well-reasoned ideas such as those of Steven Marcus on page 5 of the April 1992 *Tech-*

nology Review are adopted by Washington."

Jean and **Pete Weinert** stopped to see Phoebe and me May 5 on their way to San Diego and the America's Cup finals. Old sailor Pete (including trans-Atlantic and Mediterranean voyages) has attended every series since 1936, except Australia in 1987, but including 1937 at Newport between the last of the 125-foot "J" boats.

How many saw the full page ad of the New York Stock Exchange in major dailies May 27? **Bill Hewlett** with partner Dave Packard were featured with 17 other founders of major businesses (e.g. Merck, Eastman, Swanson, '69) creating value and profit for millions of ordinary people. A few days before our 50th Reunion, Bill gave the commencement address to the Class of 1986: "Creativity Needed To Reinstate U.S. Leadership." At hand now are the *Review* excerpts and the full text as published in *Tech Talk*. Bill included specific examples at HP, and wished the class "great bursts of creativity in all of your endeavors."

One of our creators died February 29 in Florida—**Wilbur "Bill" Jordan**, Course X, who developed and patented synthetic rubber at Firestone Tire for World War II, and was honored by Harvey Firestone. Bill retired as vice-president in 1979. His widow, Eleanor, is in a nursing home, but mail to son Robert at 840 33rd Ave., Vero Beach 32960, will reach her. Also **Aurelius "Re" Hornor**, Course XII, geology, died March 9 after back surgery four months earlier. He had spinal curvature from childhood, which grew more painful with age. Wife Mary Lee died in 1981, and he married her longtime friend Marie Clark in 1983. She and **Bob King** each told me of his worldwide exploration for bauxite for Reynolds Metals over 40 years and his activity in the American Institute of Mining Engineers. Marie is at 2221 Red Lane Rd., Powhatan, VA 23139. Cheers for the lives of Bill and Re!—**Frank L. Phillips**, secretary, 1105 Calle Catalina, Santa Fe, NM 87501, (505) 988-2745; **James F. Patterson**, assistant secretary, 170 Broadway, Pleasantville, NY 10570, (914) 769-4171

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Our 55th Reunion officially started on Tuesday, June 2, at the Hotel Viking, Bellevue Avenue, Newport, R.I. The year-long historically faithful restoration of Bellevue Ave., with its graceful glass globed, cast iron, gas street lamps; brick sidewalks; and cement road surface had been completed a short time before our reunion. The International Tennis Hall of Fame, Newport Library, and Newport Art Museum are located on the avenue and within walking distance of the hotel.

A few class members were early arrivals on Monday, June 1, and the rest arrived Tuesday from MIT. An informal cocktail and dinner party took place at the hotel on Tuesday evening with much mingling and "catching up" of each others' news and activities. Wednesday morning, we boarded a chartered, guided bus for a tour of the Newport mansions, with a stop-over at The Breakers for an in-house tour. Back on the bus to a chartered boat for a Newport Harbor cruise with luncheon served on board.

Following the cruise, we took a leisurely walk up the hill to historic Trinity Church, led by Marge Young, who is a member of the church and a volunteer guide. Her talk was informative and very interesting.

Wednesday evening we had our class dinner and dancing to music of our era. The music was supplied by a tape produced by **Pete Reitz**. Pete had generously arranged for a tape for each attendee, and additional copies are available for any class member who requests one from **G. Richard Young**, 10 Longwood Dr., #225, Westwood, MA 02090, (617) 326-8766.

Thursday we held our class meeting and elected the following officers: **Phil Peters**, president; **Dick Young**, vice-president; **Bob Thorson**, secretary;

Len Seder, assistant secretary; **Ralph Webster**, treasurer; **Walt Wojtczak**, class agent; **George DeArment**, class estate secretary; and **George DeArment** and **Joe Keithley**, reunion gift chairmen. All were elected unanimously. **Joe Keithley** announced our class gift of \$560,000 with 55 percent participation. A vote of appreciation and standing ovation were given to Marge and **Dick Young** for a splendid 55th reunion at Newport. Since we did not have a class picture taken, we request selected copies of pictures taken at the reunion be sent to **Phil Dreissigacker**, 814 Hollyhock Ln., Orange, CT 06477, (203) 799-2031. Phil has consented to make up montages of the reunion pictures.

On Thursday we returned to MIT and attended Tech Night at the Boston Pops. The program was wonderful. On Friday, there was a memorial service in the MIT Chapel followed by the Technology Day program in Kresge Auditorium, and then the alumni/ae luncheon. The program continued in the afternoon, then on to a Dean's reception followed by our class dinner in McCormack Hall. Thirty-seven class members attended some part of our reunion; and at Newport 30 members plus 23 guests, a total of 53, attended.

Len Seder says the reunion offered a wonderful opportunity to search into classmates' minds and dig out memories all of us will enjoy. Everyone was asked to fill out questionnaires, with the following interesting results. *What profs shined in our memory?* Homerberg, Waterhouse, Fasset, Hayward, Rutledge, Fitzgerald, Magoun, Edward Swarz, Frank Millard, Burdell, Schell, Smith. *What courses were most beneficial?* Humanities (Magoun) physics, marketing, textile engineering, chemical engineering practice. *What courses were more difficult and beyond us?* Accounting, electrical engineering, physics, english, industrial stoichiometry, freshman chemistry, differential equations. *What activities were high points?* Cross country, *The Tech*, VooDoo, Freshman Camp, crew, fraternity living, freshman tug-of-war, squash, gymnastics, drama-shop, track, walking across Mass. Ave. bridge. *What social activities were high points?* Beer parties at Jake Wirth's, Junior Prom with Benny Goodman, fraternity dances, Spring Dance in senior year. *Where should we hold our 60th?* Beverly C.C., Ogunquit, Maine, in bed, Boston, Endicott House, Boston or Cambridge hotel, Cape or North Shore resort, Weekapaug Inn.

Joe Heal reports that although Marion, who has Parkinson's Disease, is in a nursing home, she is able to come home every day during the day. . . . **Ray McFee** couldn't make the reunion but writes that he lives in Laguna Hills, Calif., is semi-retired but still a consultant to McDonnell Douglas Corp. He was a co-author in 1990 of a paper in ASME on solar power system design and is interested in choral singing. . . . **Bob Glancy** lost his wife, Carrie, in July 1991. He is now living in a townhouse at 76 Village Dr., Stroudsburg, PA 19360-1500. We were glad to see Bob at our reunion, who said he had a wonderful time.—**Robert H. Thorson**, secretary, 66 Swan Rd., Winchester, MA 01890; **Leonard Seder**, assistant secretary, 1010 Waltham St., #342B, Lexington, MA 02173

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55th Reunion

We regret to announce the deaths of three classmates—**John Perkins** of New Bern, N.C., last November 15; **Neil Starr** of Houston, Tex., on March 18; and **Richard Koehrmann** of Alton, Ill., on May 3. . . . John was a Course XIII and had retired from Gilbert Associates. . . . Richard graduated in Course X and had worked in the plastic products division of International Shoe and the organic materials lab of Sears Roebuck. . . . Neil, from Course XV, had been with the Seabees during the war and retired from Tenneco in 1979, having worked on pipeline construction and the conversion from natural gas to coal gas. After retirement, Neil was a volunteer for the Arthritis Foundation and a teacher's aide.

At the Technology Day Memorial Service in June, the following were honored: **Gordon Foote**, **Haskell Gordon**, **Murray Hayward**, **Bob Iredell**, **Marvin Kahn**, **Les Kornblith**, **Bob Morgan**, **Corny Roosevelt**, **Warren Thomson**, and **Bob Treat**.

As we've mentioned in previous class notes, we don't want to lose track of surviving spouses. **Don Severance** invited several of them in the New England area to our mini-reunion in June and received newsy replies from Eileen Bethel, Ruth Black, and Ina Gordon. Ina was going to Israel, Ruth had to take care of Paul's brother, and Eileen was off to Germany to visit her daughter at the U.S. Embassy. She was still there on June 14 when Jean and I were in Longmeadow, Mass., with our grandchildren. . . . Don also got a letter from **Roy Hopgood** apologizing for putting a business trip to England, Italy, and Germany ahead of the delightful time he would have had with us at Endicott House.

While on the subject of the Endicott House mini-reunion, our indefatigable class secretary, ever on the lookout to provide work for his assistant, distributed writing paper to all those present and instructed them to provide information for the class notes. Some complied; others took pity on me and refused to cooperate. . . . Sylvia and **Sol Kaufman** had just returned from visiting their son in Israel; they're expecting twin Sabras in September.

Dick Muther has just returned from his eighth trip to the Orient. (The press release doesn't say whether Louise went with him.) The objective of his 30-day tour was to train industrial facilities engineers in three major Chinese cities, concentrating on the moves from overcrowded urban centers to newly developing suburban areas.

Morse is looking forward to cataract surgery; his girls are still in Cambridge, England, and Denver after many years.

Sandy and Lou Bruneau made their usual spring tour to England. . . . **Fred Kolb** has just completed a 400-entry, 55-page, 26,000-word glossary oriented toward image processing in the digital environment for publication by the Society of Motion Picture and Television Engineers. He hopes to improve communication among the practitioners of photography, graphic arts, computer graphics, data processing, and telecommunications, all of whom use the same language but have different definitions for the same words.

Others at Endicott House included **Florence and Sid Baron**, **Hilda and Norm Bedford**, **Roberta and Horace Homer**, **Pat and Bob Johnson**, **Ruth and Frank Kemp**, **Muriel and Norm Leventhal**, and **Phyl and Don Severance**.

A map exhibition in the Boston Museum of Science and Industry opened June 2 consisting exclusively of maps collected over the years by **Norm Leventhal**. In addition to **Muriel and Norm**, opening evening ceremonies were attended by **Phyl and Don Severance** and **Sylvia and Sol Kaufman**. Your assistant secretary certainly intends to get there before it closes.

Rafael Sanchez, who escaped from Cuba 30 years ago with nothing, has made a success of himself and is now living in Miami after sojourns in Mexico and California. . . . **Martha and Jan Jansen** had compiled a slide show of their hometown, entitled "Topsfield [Mass.] Then and Now." Many of the slides were reproduced from old glass-plate negatives. The Jansens have also created an extensive photographic library for researchers who want to dig deeper into the town history.

I apologize for a grievous error in the April notes. **Harold Strauss** did not have a heart attack; he suffered "cardiac death" in the presence of CPR experts. Four minutes later the paramedics were there and in fifteen minutes he was in the hospital. He now has an implant that delivers a multi-kilovolt mule kick to his heart if it detects an anomaly. Prognosis is good.

The children of **Jean and Ed Hadley** agonized over the problem of getting together for our golden wedding and finally gave up. All 30 of us—2 old folks, 8 children, 6 spouses, and 14 grandchildren—

hope to congregate in Jamaica in August. In the meantime, we old people spent March 21 in colonial Williamsburg with some dear friends of over 50 years and went from there to Pompano Beach for 10 days. In May we visited Guatemala, Belize, and Honduras. . . . **Phyl and Don Severance** meanwhile journeyed from Wellesley Hills to Wellesley, Mass., a much more cultural trek.

Your 55th Reunion Committee, chaired by **Norm Bedford**, is well on its way toward a successful and memorable week, June 7-12, 1993. Besides our own meetings to firm up responsibilities and campus and hotel arrangements, we were invited to a "Reunion Kick-Off" in April, at which the Institute staff outlined what we should watch for and how they could help us. We had dinner with two '38 scholars, **Steve Confort**, of Smithtown, N.Y., and **Monica Arozarena** of Denver.

Seeing them made me even surer that the 1938 Scholarship Fund is a worthy cause.—**Don Severance**, secretary, 39 Hampshire Rd., Wellesley, MA 02181; **Ed Hadley**, assistant secretary, 50 Spofford Rd., Boxford, MA 01921

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Class President **Seymour Sheinkopf** relays this news: "The Class of 1939 Scholarship Fund has grown to \$523,109. Seven seniors receiving our help graduated in June 1992 with records varying from solid to quite impressive. Six other undergrads are receiving our help and their average cum was over 4.2, with a low of 3.5 and a high of 4.8 and they are active citizens of the community."

Hew Phillips and **Viola** wrote **Jim Barton** and **Mary** a stimulating letter, which told of Hew's recent activities. "The AIA encourages students in science and engineering and at Hampton, Va., High School there was interest to build the world's largest paper airplane. Up to 1991, the record wingspread was 16 feet 4 inches."

The Hampton public school system assigned four or more seniors from each of four Hampton High Schools to this project and they were assisted by Hew and three other NASA retirees.

"Flight trials were in the NASA Flight Research Hangar at Langley Field and witnessed by large crowds. Initially, wingspread was 24 feet, but this was increased to 30.6 feet for the record-breaking flight in early 1992. The plane weighed 8.7 pounds, was made solely of paper and glue, launched by hand and glided 114 feet, 9 inches from a 10-foot-high platform. The record-breaking model will be put on display in the new Virginia Air and Space Center in downtown Hampton."

George Cremer, thrilled recently by his first flight in a hot-air balloon, celebrated Birthday #75 by inviting eleven long-time friends and career associates for a low-altitude flight in a chartered Ford Trimotor monoplane. The flight was at 800 to 2,000 feet at 90 miles per hour over the scenic sunny Pacific Coast between Tijuana and Encinitas. Among George's guests was **Ed Morrow**, now 92, formerly much involved with the Spirit of St. Louis, built by **Ryan** in San Diego, flown by **Charles Lindbergh** across the Atlantic in 1927, and centerpiece of a celebration 50 years later in a San Diego U.S. Coast Guard Hangar. **Hilda** and I were privileged to be there with **George Cremer** and **Billie**. Also on George's birthday flight was **Art Walgraff** who made 127 flights over the Hump in the China Burma Theater during World War II.

There is still time to join classmates and schoolmates at the MIT Florida Reunion for Survivors, sponsored by Classes 1939, 1940, and 1941. **Bob Touzalin** and **Aletta** are Chief Holders of the Broom for '39er arrangements and welcome '39er volunteers to help and enjoy.

Manning Morrill and **Connie** write: "We visited in Mexico and Los Angeles enroute to the San Diego cup races. Sorry to have missed a planned overnight with **Eugenia** and **Fred Cooke**, but relieved to learn afterward their unscheduled trip to a Los Angeles hospital turned out to have a "don't know why" diagnosis.

Candace Howes, **Anne** and **Ben Howes'** daughter, wrote that her mother had died in 1991 in Connecticut.

Reunion Chairman **Fred Grant**, **George Beesley** and I scouted locations for our 55th Class Reunion. Now **Fred** sends these details: "Our 55th will start Tuesday, May 31, 1994, at the Hotel Viking in Newport, R.I. We travel to Cambridge after lunch on Thursday, June 2, in time for supper and Tech Night at the Pops. The reunion will end after Tech Day, Friday June 3, probably after lunch for most of us. We hope to have a full committee lined up by March/April 1993 after which full details will come. Meanwhile, classmates should note the dates and mark calendars." . . .

Jim Barton and **Mary** plan to attend the Convocation of Sloan Fellows during October in Cambridge. . . . **Dodie Casselman** is recovering nicely



In Shanghai, Dick Muther, lower right, is shown critiquing a master site plan with professional planners involved in China's major Pudong development project.

Barbara and Wes Cilley have one granddaughter graduating cum laude from the University of New Hampshire and another grandchild born in Hong Kong. . . . **Marie and Paul O'Connell** didn't write anything, but **Ruth Black** said in her letter that they were on an Elderhostel tour in Italy in April. . . . **Paul Desjardins** got a horse to kick **Madelyn** in February at Edfu, Egypt, and fracture her pelvis; she's still a little rocky but has discarded her cane.

Al Wilson is finally out of the structural steel business and he and **Carol** were able to spend 10 days downhill skiing in Vail (no fractured anything). . . . **E and Frank Gardner** stayed home celebrating their golden wedding anniversary and preserving the health not only of their own lake but of all the lakes in New Hampshire in conjunction with the N.H. Audubon Society. . . . **Dave**

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with family on the Cape after a recent fall. . . . George Beesley and Eleanor relay news that all goes well with **Gus Hunnicke** and **Nick Carr** and **Lynn**. The Beesleys are vacationing at Lake Winnebago, and later at Banff and Lake Louise. . . . **Bill Pulver** and **Adie** are interested in puzzles. When they are not away golfing or skiing or ice-boating they welcome opportunities to exchange braidtwisters.

We have two stories for the "It's a Small World Department." When Ted Wroblewski, volunteer for the Alumni Fund, called on Joseph Smullin, '66, owner of a small boat business in Swampscott, he learned Joe was the son of Professor Emeritus Louis Smullin, whose classes Ted remembers vividly. Classmates who studied under Professor Smullin will be interested to know he is senior lecturer in the department, rides his bicycle daily to campus, and attends faculty meetings regularly.

Martin Lindenberg and Mary were browsing through their 1939 *Technique* yearbook before celebrating the 53rd anniversary of his graduation. Mary saw a picture of Robert Bloom, '42, remembered him from PS80 in the Bronx, but had not seen him during the intervening half-century. The two couples met in Cambridge at Martin's 53rd and this reporter ventures a general guess that reminiscences get better as the years go by.

We are saddened by report of the death on October 2, 1991, in San Francisco of **H. Kendall Raymond**. There were no details.—**Hal Seykota**, secretary, 2853 Claremont Dr., Tacoma, WA 98407

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Franklin Penn writes from Darien, Conn., that he is still serving as chairman of the Darien Planning and Zoning Commission, is in good health, and is looking forward to the remarriage of his son, who lost his wife three years ago. Frank also reports the death of **James E. Fifield**, also of Darien, on January 23, 1992. Jim served as a lieutenant (j.g.) USNR during World War II. Thereafter, he worked for International Nickel Co., Ductile Iron Foundry, and then for Intsel Corp., from which he retired as vice-president, mill product sales, in 1984.

A letter from **David "Beano" Goodman** describes his Florida visit to Fred and **George Kaneb**. Fred was an excellent host. Beano's hip is much better, and he is hoping to get back to tennis playing when he removes a few pounds.

More currently, Class President **Norman Kli-vans** and **Alice**, Sally (Mrs. **Robert Bittenbender**), and I met for lunch with Diana Strange of the Alumni/ae Office to discuss the upcoming mini-reunion in Naples, Fla., next January, and our 55th Reunion in Newport, R.I., in June 1995. To date there have been about 40 firm or anticipated reservations for the Naples get together, so the program will be carried forward. We discussed the Hotel Viking plans at Newport, heard of the report by the Class of '37 about how fine the Viking was in all respects, and talked of suggested changes in the proposed contract.

A letter from **Fred Noonan** of San Francisco indicates his intention to attend the reunion. He also says that he had had a phone call from **Toivo V. Kyllonen**, but no further information was included.

I was very pleased to be invited by **Amos E. Joel, Jr.** to attend a May 10 special meeting of the Institute of Electrical and Electronic Engineers at which he received the Medal of Honor, the highest award given by IEEE. The guest booklet detailed much of Amos's career at Bell Telephone Laboratories, beginning shortly after graduation and still continuing on a consulting basis since his official retirement in 1983. At Bell his efforts were devoted to the study, design, and evaluation of telephone switching systems, a field in which he has made many significant contributions. Versions of some of these systems are in service throughout the country. He has received a basic patent for his early studies of the switching aspects of cellular mobile radio service and holds more than 70 other U.S. patents,

including the largest ever U.S. patent for his work on A.M.A. He has authored and co-authored several books and numerous papers on switching. Over the years, he has been the recipient of many other honors and awards and has served in many prominent positions in IEEE. He is also a member of other engineering and honorary societies.

My most faithful correspondent, **Alvin Guttg** sends a note telling of his travels to Lake Worth, Fla., Houston, Memphis, Nashville, and West Chester, Ohio, to visit family members. In between, he managed a trip to Portugal, Morocco, and Spain. He enclosed a letter from **C. Norman Sjogren** thanking Al for the cards he has sent over the years to Course V class members.

Letters sent by the Alumni/ae Association to **Augustin Cabrer** in Humacao, P.R., were returned indicating that he died on March 23, 1992. There is no further information.

Albert Beucker, retired director technical services, research and development, Beloit-Manhattan Inc., was recruited by International Executive Service Corps to assist a manufacturer of rubber goods in San Jose, Costa Rica, with improving production and quality control.

Paul W. Witherell, a semi-retired associate provost at Wentworth Institute of Technology, has been nominated as a member of the 1992-93 board of directors of the Massachusetts Society of Professional Engineers.

Letters, telephone calls, and news items may be addressed to **Richard E. Gladstone**, secretary, 1208 Greendale Ave., Needham, MA 02192, (617) 449-2421

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Sepp Dietzgen's 1941 mini-reunion dinner last July 3 at the MIT Faculty Club actually took place, and a fine time was had by all. Attending were **Leona (Norman)** and **Bud Zarsky**, **Edythe** and **Art Covitt**, **Dot** and **Joe Gavin**, **Alice** and **Les Gott**, **Natalie** and **Ed Marden**, **Alice** and **Stan Marple**, **Mitch Marcus**, your president, and your secretary. After cocktails and a very pleasant dinner, Sepp had arranged for Ms. Maureen Costello to speak to us about the arts and humanities programs at MIT. Ms. Costello is the director of Special Programs in MIT's Office for the Arts, reporting to Assistant Provost Ellen Harris. She coordinates special functions, exhibits, and courses by visiting scholars. These are an important part of the ambitious humanities program at the Institute, as well as its local, national, and international relations, and add to the wide cultural experiences provided for MIT students.

Malcolm "Joe" Dodd writes that he was invited to attend a salute to the 50th anniversary of America's first jet flight, at the Flight Test Historical Foundation's Seventh Annual Tribute to Aerospace on May 9, 1992. He will also attend a ceremony at Edwards Air Force Base, California, on October 2, 1992, the actual anniversary of the flight of the Bell XP59A, "Aircomet". In 1942, as a brand-new second lieutenant of engineers, Joe became involved in this project when he was assigned to build a remote test site for the aircraft in the desert. EAFB has since become a famous location in aviation and space history and is currently being used for Space Shuttle landings. There is more to the story. We all regret that Joe did not submit a biography for the 25th or 50th Reunion books.

Albert Bensusan and his wife, **Clare**, have returned home to Cranston, R.I., after Albert served as a volunteer in Guatemala City, Guatemala, for the International Service Corps. A retired vice-president and treasurer of Bugbee & Niles Co., Providence, R.I., he was recruited to assist a costume jewelry manufacturer with improving manufacturing processes and sourcing equipment. The Bensusans attended the 50th Reunion and his biography is in the yearbook.

Jack Lyons called from Punta Gorda, Fla., to say that **Robert E. "Bob" Bailey** had passed away on



Magician Ace Tabularius (aka Jack Sheetz, '42) delights young and old alike with cups and balls. "It's the oldest trick known to man," he says. "Pictures of cups and balls have been found in ancient hieroglyphs in the pyramids of Egypt." Jack educates as he entertains during his 50th Reunion in June.

After a multifaceted career in fund raising and data systems development for MIT, the Harvard Business School, and Tufts University, Jack has turned his attention towards magic. In the Class of 1942 50th Reunion book, which Jack devoted a year full-time to producing, he writes that he was privileged to take lessons from the best close-up magician in the world, Gazzo Macee. Jack has performed in

Harvard Square, Faneuil Hall, and has worked alongside the top buskers (street performers) of the world at the International Buskerfest in Halifax, Nova Scotia.

One of Jack's greatest disappearing acts, according to his wife, Linda, was to their basement to work on the class reunion book: "Who was the shadowy figure who passed me on the stair, looking vaguely familiar?" To prepare the 266-page book of bios, anecdotes, Technique photos, and personal remembrances of deceased classmates, Linda and Jack hand-stamped inquiries and personally acknowledged all submissions. But Linda concludes that the time spent on the book greatly enriched their lives with new friendships and the renewal of old ones.

April 15, 1992. He had no other details. Bob was a meteorologist, working over the years for Panagra and Eastern Airlines, Ford Instrument, United Aircraft, IBM, and Environmental Research Corp., mostly on advanced forecasting and other weather technology. Since retirement in 1975, he wintered in Fort Myers Beach Fla., maintaining a home in Silver Spring Md. Last spring before the 50th, which he attended, he called me to check on whether he was the only local person who hadn't gotten his red coat. We both got them in time. He is survived by his wife, Betty, two grown daughters, and six grandchildren.

Walter J. Kreske of Newton Center, Mass., passed away on January 2, 1992. Walt worked briefly in industry before being called to active duty in the Ordnance Department. He was released as a captain in 1945 and graduated from Harvard Law School in 1948. After passing the Massachusetts and Patent Bar, he was employed by several legal firms and Raytheon Manufacturing Co. He opened his own office in 1952, concentrating on patents, trademarks, and unfair competition. He was known for spearheading the drive for the mandatory registration law for registered engineers in Massachusetts. He is survived by his wife, Elizabeth, and a daughter. His son predeceased him.

On January 17, 1992, Eugene E. Crawford died

in Napa State Hospital, Calif., after a long battle with cancer. He had been hospitalized since 1974 with viral encephalitis. A Course IV graduate and winner of the Alpha Rho Chi Medal, he became a lieutenant commander in the Navy during World War II. In 1946 he moved to Mill Valley, Calif., and practiced architecture with several firms, finally forming his own firm. Over the years he was responsible for many important municipal, industrial, and private buildings. Elected a fellow of the American Institutes of Architects in 1969, he served as president of the California Chapter, director of the national AIA, and as a member of many civic and charitable organizations. He is survived by his wife, Susan, a son, daughter, and two grandchildren.

Alexander F. Leonhardt died on March 10, 1992, at his home in Darien, Conn. Graduating in Course IX-B, he served in the U. S. Navy from 1941-1946, achieving the rank of lieutenant commander. He was an engineer by profession, but a sailor by choice. The 1989 Alumni/ae Register lists him as president of the Enterprise Construction Co., Noroton, Conn. He is survived by his wife, Serena, and two sons.

An Alumni/ae Fund solicitor report indicates that Edgar W. Engle, Jr., Course II, passed away on February 19, 1990. He is survived by his wife, Ellen. There was no other information.

At this time, when the ranks of 1941 seem to be thinning, the lucky survivors express their sympathy to the bereaved families.

By now you may have heard from Chet Hasert, who is leading the effort to provide a shell that would memorialize Charlie Butt and his outstanding national rowing and coaching career that started at MIT. Chet's first letters went to Charlie's close Course XVI associates and crew members who frequented the boathouse from 1938 to 1941. Chet would welcome contributions from others. His new address is: Chester N. Hasert 12311 Country Ridge Ln., Fairfax, VA 22033; (703) 715-0905.—Charles H. King, Jr., secretary, 7509 Sebago Rd., Bethesda, MD 20817, (301) 229-4459

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With our festive and enjoyable 50th Reunion now part of class history, one more note of thanks goes to Jerry Coe, Floyd Lyon, Jack Sheetz and the committee for making it all happen.

Message from our president, George Schwartz: "For all of you who were not able to be with us at Cambridge and Woodstock for our 50th, we are nonetheless interested to know how and what you are doing. Almost all news is good news, so keep Ken Rossett and Class Notes in mind—we could all benefit from hearing about you from time to time."

Congratulations to George Spies upon receiving the American Welding Society's annual Health and Safety Award. . . . Lou Rosenblum, still working on type face design, attended the recent meeting of the Greek Font Society in Athens. . . . A note from Heinie Shaw reminds us that many companies have matching gift programs for retirees. He suggests that each of us check our companies to see whether this might be a source of new gifts to MIT.

We're invited to the Classes of 1939, 1940, and 1941 reunion January 4-7, 1993, in Naples, Fla. If you're interested, get in touch with: Norm Klivans, 3123 Bremerton Rd., Cleveland, OH 44124.

Warren Powers is still very actively consulting—last year in Poland, the year before in Nairobi, and this year Cochobamba, Bolivia, to work on drying of vegetables and fruit there. . . . Bob Rines retired as president of the Franklin Pierce Law Center and assumed the chairmanship of the center. He continues as president of the Academy of Applied Sciences and as chairman of the American Bar Association's Committee on Technology Assessment.—Ken Rosett, secretary, 281 Martling Ave., Tarrytown, NY 10591

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50th Reunion

It is with great sadness that I report the passing of Bernie "Red" Brindis on May 28, when he failed to recover from heart surgery. Red was a native of Haverhill, Mass., but lived 35 years in New Jersey following Navy service in World War II. His active business career was spent with a family-owned leather goods manufacturing company, where he served as president and CEO. After retirement in 1982, he moved to the Boca West community in Boca Raton, Fla. Throughout his life Red was a leader in civic and Jewish activities, and was an enthusiastic tennis and golf player. Those attending the GSWC-FMM meeting in Albuquerque three years ago enjoyed Red's and Lenore's company. We grieve that he will not be donning his red coat with us in 1993. Besides Lenore, Red leaves three children, four grandchildren, and three brothers. Our condolences go out to them.

Red was a dorm roommate of Jim Spitz, who wrote to say that he and other roommates Jim Malloch and Harry Ottinger, with their wives, got together in Savannah, Ga., in early May for a few days of golf, tennis, fishing, sight-seeing, and partying. Red would have been the only non-ChE in that group, but for health reasons he and Lenore couldn't attend.

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Two other obituaries have been received for classmates, both chemical engineers, who died in 1991. . . . **Morton Schultz** lived in Rockville Centre, N.Y.; **Warren Fuchs** in Syosset, N.Y. Both were members of Pi Lambda Phi Fraternity.

From New London, N.H., comes word that Colby-Sawyer College has elected **Charles J. Lawson** (Course XV), of Springfield, N.H., and Naples, Fla., chair of its board of trustees. Following World War II Army service in Europe, Charles was employed for 15 years by IBM. He then became a founder/leader of two other high-tech companies, retiring in 1984 as a group vp of EG&G. He has been a director of several banks and public companies, as well as a trustee of Marist College, Poughkeepsie, N.Y.

I like it better when news items about the living outnumber the obituaries. Those of you who can still write, please do.—**Bob Rorschach**, secretary, 2544 S. Norfolk, Tulsa, OK 74114

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Technology Day, June 5, was attended by Dianne and Andy Corry, Jane and Louis Demarkles, Robert Smith, Melissa Teixeira, and Stan Warshaw. The theme, Winds of Change—Achieving Global Business Excellence for America in the 21st Century, was another fine program.

Robert E. Myerhoff founded a scholarship program in 1988 at the University of Maryland, Baltimore, for academically gifted black students committed to studying science. According to the *New York Times*, Myerhoff created the program with an initial gift of more than \$500,000 from the Robert & Jane Myerhoff foundation (the total has grown to more than \$1 million) because he had been disturbed by the plight of so many young black American men. The program, which now includes female students, has drawn national attention and financial contributions from the National Science Foundation, NASA, AT&T, and Apple Computer. Of 70 Myerhoff scholars enrolled thus far, only one has dropped out, changing to a non-science major. "It has been extremely gratifying," Myerhoff told the *Times*. "I always felt that black students had more disadvantages in the sense of not having the economic advantages that a typical white college student had."

Robert M. Copesey writes from Hidden Hills, Calif., that he received Air Force commendation for defining concise technical evaluation criteria used in acquisition of Navstar GPS Satellite Navigation Equipment.

Harry Kenosian reports that he is semi-retired. After many years he has renewed his amateur radio license—NS3A. He would appreciate a radio call from any of his amateur radio classmates or any MIT radio people.

Please send along information on yourselves and other classmates.—Co-secretaries: **Andrew Corry**, P.O. Box 310, W. Hyannisport, MA 02672; **Louis Demarkles**, 77 Circuit Ave., Hyannis, MA 02601

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It is mid-June, yet you will not receive these notes until October. Oh well! The following attended Pops and our usual pre-Pops social and dinner at the Hotel Colonnade on June 4; Dr. and Mrs. **Edward Brooks**, Ellen and **Jim Brayton**, Janice and **Dave Flood**, Dee and **Frank Gallagher**, **Ruthmary Jeffries**, Anne and **Bob Maglathlin**, Louise and **Tom McNamara**, **Bill Meade**, Jan and **Charlie Paterson**, Carol and **Jim Pickel**, **George Berman**, **Mary Trageser** as well as Fran and myself—a hale and hardy group, to say the least.

At the Technology Day Luncheon your class was represented by **Vernie and Ray Gammer**, **Art Miller**, **Ruthmary Jeffries**, **Emily Wade** and yours truly. Paddy and Jeff had not seen one another in years and it was interesting to hear more about grandchildren than one's professional career.

I did catch up with a couple of '47ers who were originally in our class: **Art Schwartz**, who is toying with the thought of picking his red jacket in '95, as well as **Abbott Fletcher**, currently president of MIT Club of Maine and a former VP at Bath Iron Works. Art indicated that **Sherry Ing** had been under the weather but now appears to be on the mend.

Jake Freiburger has had many conversations with **Jim Brayton** and myself the past several months in an effort to put together a Christopher Columbus Cruise in his Hinkley 48 yawl. Unfortunately these plans have not yet jelled. One positive note, however, as our ongoing negotiations brought **Bobby Symonette** and **Jake** together as fellow Bahamians—well, almost, as **Jake** truly resides in Dallas with Man-O-War Cay serving as a retreat.

In the course of these conversations **Jake** and I truly realized how difficult it is for one to find cruising crew; yes, we both have our boats on the market. One at 27-feet and the other at 48; step right up with your offer as they are not likely to go fast!

Although we were going in different directions, Fran and I did enjoy being with **Jean and Prexy Chris Boland** in London in early May. Talked at length with **Waite Stephenson** in early June. Waite retired from Bechtel in 1984 at age 60 after many years of interesting overseas assignments. I was particularly interested in the information he forwarded as respects Exxon's involvement in the MacVicar Faculty Fellows Program.

Our 1994 V-12 Reunion is starting to germinate and we now seek a theme. One of your classmates has developed the thought of "Why didn't I get caught?"—and while you are working on this theme where do you want to go for our 50th in 1995?—**Clinton H. Springer**, secretary, P.O. Box 288, New Castle, NH 03854

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Bob Hoffman, our new 50th Reunion chairman, sends a letter telling, among other things, about his attending Technology Day last June. Being an off-year, just a handful came, including **Bob's** wife, **Marion**, and **Nancy and John Taylor**, who attended Pops at Symphony Hall ("excellent"). Others registered were **Bob Fried**, **Bill Siebert**, and **Cliff Sibley**. The Tech Day program, hosted by the Economics Department, was excellent, says **Bob**, but the weather wasn't quite as good. The next day **Bob** and **Marion** took their first trip to Gloucester to visit an old high school buddy.

Bob invited me to join him for a sail on his boat in Barnegat Bay (an old Jersey fishing/hunting haunt of my youthful years). I just might do this about the time you're reading this. . . . **Bob** talked to **John Gunnarson** by phone to hear how he was coming along on his prostate surgery, which he reported all good.

From **Giff(ord) Stanton**, originally a Long Islander who has lived in Bermuda for these many years, we learn that he was a marketing division manager in the Gorling Co. Having retired a little while ago, he "has never been so busy since." He's refurbished their Marley Beach Cottage Hotel, is running the Hamilton Rolay Club Student Loan Fund, and is helping launch a senior learning center at the Bermuda College. He's learned to play "almost acceptable tennis." If you'd like to get in touch with him, call him at (809) 236-1143 or fax him at (809) 236-1984.

Along the way I've run across a couple of old names who don't show up in the year book but ones I remember and are presumably alive and well. They live in each end of our country. **John Serrie**, a longtime shipbuilder, currently abides in Tenants Harbor, Maine, where he may very well still be working on boats. . . . **Bob Slothower** was one of our famous XVers who migrated to Canoga Park, Calif., eons ago and plied his trade at various aircraft companies. That's about all I know. If either one of you is reading this, please drop me a

47

We held our 45th Reunion, as advertised, from June 3 to June 7 in Cambridge and at the Black Point Inn, just south of Portland, Maine. Forty-one of us attended at least some part of the festivities; most of us went to the Black Point. In addition, there were 31 spouses. Twenty-one classmates came from New England and 20 from west of the Hudson, including 6 from west of the Mississippi. The highlight of the Cambridge activities was, as always, Tech Night at the Pops.

Our accommodations at the Black Point were great and the food was superb. The only fly in the ointment was the weather! Unfortunately, we had lots of rain and fog—which meant no golf, no sailing, and not much tennis! But we enjoyed ourselves regardless. Our roster there included **Lois and Harl Aldrich**, Mary Jane and **Dan Bender**, Jeannette and **Bob Clount**, **Claude Brenner**, Esme and **Bart Carmody**, **Dan Carnese**, Martha and **Dave Clapp**, Marge and **Steve Dieckmann**, Joan and **Fred Ehrich**, **Abbott Fletcher**, Lorelei and **Hugh Flomenhoft**, Martha and **Alex Giltinan**, Ginny Grammer, Marju and **Martin Haas**, **Ted Hogg**, Lois and **Ken Marshall**, Ann and **Bob McBride**, Mary and **Dick Mooney**, Florence and **Aaron Newman**, Nita and **George Oliver**, Adele and **Alex Pastuhov**, Arline and **Jim Prigoff**, Barbara and **Bob Rediker**, Al Richardson, Karen and **Jack Rizika**, Harriet and **Ed Rosenberg**, Florence and **Leon Scharff**, Margie and **Art Scharitz**, Betty and **Harry Sherman**, Joan and **Reid Smith-Vaniz**, Frances and **Phil Solomon**, Midge and **Parker Symmes**, Kathy and **Don Van Greenby**, Cornelia and **Fred Veith**. In addition, **Winnie Bennett Corniea**, **John Ebersberger**, Wilma and **Ray Hasse**, **Ed Kane**, **Bill McClelland**, **Carol Tucker** and **Wilson Seward**, and Jane and **Howard Zwermer** were with us in Cambridge.

Thanks to our trusty tape recorder, we were able to get several news tidbits. In alphabetical order: **Lois and Harl Aldrich** were largely responsible for our being at the Black Point Inn. They have a cottage in the Rangeley Lakes area of Maine and they were nominated to "check out" the Black Point while en route to their cottage last fall. Good choice, Harl. Harl retired two years ago and has been devoting most of his time since then to fund-raising—for MIT and also for an engineering center to provide continuing education for design professionals in Boston.

Dan Bender retired from General Electric as marketing manager of the Ordnance Division in Pittsfield, Mass., in 1982. Since then, he and Mary Jane have been traveling—Bangkok, Taiwan (they have a daughter living there), London, and they're headed for Scotland this fall. (So are we—maybe we'll run into each other.) Dan was responsible for one small mystery—who owns the Texas Cadillac that keeps appearing at our affairs? He does—they summer in Massachusetts and winter in Tucson, but their home is near Houston.

Bob Blount retired from the Navy as a rear admiral 10 years ago; he and Jeannette now live in Norfolk, Va., "with a lot of other retired Navy." After retirement, Bob worked for Sippican for several years and is now working with Edo. He was a submariner and commanded three subs during his career—the *Barbero* and two nuclear powered subs, the *Permit* and the *Patrick Henry*.

Claude Brenner founded Commonwealth Energy Group in 1981 to work in energy management. Claude still operates under that name but mostly as an individual consultant. He helps technology-based companies with business development and planning, marketing strategy, and strategy for development of federal contract proposals. He's also on the board of governors of the MIT Club of Boston and chairs two of their programs: Windows on MIT Distinguished Lecturer series and MIT Symphony Orchestra concerts at Christmas

and in the spring. At the reunion we re-elected Claude as our class president for five more years.

Bart Carmody retired from Union Carbide in 1986 as manager of procurement for capital expansion. Prior to that, he was also chair of the board of a hospital in Mt. Vernon, N.Y. After retirement, Bart and Esme moved to Oldsmar, Fla., where he divides his time between "just being retired" and doing some consulting work in procurement. Bart and Esme, collectively, have 13 children and 16 grandchildren!

Dan Carnese worked for Sikorsky, Boeing, Vertol, and Republic Aircraft until he retired a couple of years ago. He started designing and testing helicopters after graduation and then moved into the fast lane—designing and testing supersonic fighter bombers (the F-105). Then he went back to helicopters until he retired. He's also been active in local politics and is now involved in town government in Westport, Conn. Dan's son graduated from MIT 12 years ago and is running a successful computer software and systems business.

Dave Clapp is a computer programmer with the U.S. Department of Transportation at the John A. Volpe National Transportation Systems Center. Wife Martha is manager of Volunteer Programs and Taxpayer Education for the Internal Revenue Service in the Boston district.

Now, our special offer of the month. All those attending the reunion received a very attractive set of six coasters showing a picture of the Great Dome and inscribed "MIT Class of 1947, 45th Reunion." If any of you would like a set, they are available for \$12, postpaid, from Claude Brenner, 30 Preston Rd., Lexington, MA 02173, (617) 862-6360.

We'll have much—much more—from the reunion in future columns. Stay tuned.—**R.E. (Bob) McBride**, secretary, 1511 E. Northcrest Dr., Highlands Ranch, CO 80126

48 45th Reunion

George Macomber was honored by the Massachusetts Special Olympics as an exemplary role model for Special Olympians. He attributes much of his success to the benefits of organized sports, training, and competition. The hard work and



George Macomber

determination required makes everyone a winner by giving each individual a sense of pride, confidence, and self-esteem: all qualities that lead to success. George was a member of the 1948 and 1952 U.S. Olympic Ski Teams. "Great measures of preparation and commitment are required of an athlete, whether they win or lose in their event,"

says George. "Developing this unconditional determination enables one to take greater risks and reach higher accomplishments in all areas of life, while hopefully getting rewards from the pursuit as well as the result." George was President of the George H. Macomber Co. from 1959 to 1987. During his tenure, the company built Faneuil Hall Marketplace, the Four Seasons Hotel, and many buildings at MIT, Yale, Harvard, Tufts, and other locations. Also, he was one of four original developers of Wildcat Mountain in New Hampshire.

During Technology Day last June, the Class of 1947 invited us to join them at a buffet on the West Terrace of Walker Memorial. The weather cooperated and this delightful setting recalled earlier experiences there. Jean and **Milton Slade**, Virginia and **George Clifford**, **Harold Ottobriani**, **Peter Saint Germain**, **Graham Sterling**, and yours truly enjoyed the company of Claude Brenner, Harl Aldrich, Jack Rizika and many other members of the Class of 1947.

The next day **Bob Ormiston** and I enjoyed hearing President Vest's clear and straightforward annual report to alumni. Mary and **Bill Riordan** were among the guests at the dean's reception.

Milton Slade, chairman of our 45th Reunion, held a reunion committee meeting in May at the Stratton Student Center. The meeting was attended by **Harold Ottobriani**, **Sonny Monosson**, **Bob Sandman**, **Verity Smith**, **George Clifford**, **Stan Abkowitz**, **Al Seville**, Eliza Dame of the Alumni/ae Association, and yours truly. The Nantucket Inn on Nantucket was selected as the location for our activities on May 31-June 2, 1993. While on Nantucket, the committee will organize a historic walking tour of the homes built by the whaling captains in the early 1800s. On Thursday, June 3, buses will be available for the trip back to Cambridge. Thursday night, a pre-Pops buffet for our class is planned on the third floor of Statton Student Center. Friday's Technology Day program is being spearheaded by Professor Francis Ogilvie, head of the Department of Ocean Engineering, which is celebrating their 100th Anniversary in 1993. The department's activities include off-shore drilling rigs, deep water submersibles, ocean exploration, and design of racing sailboats for the America's Cup.

John Little received a 1992 Converse Award from the American Marketing Association for his publication of "Models and Managers: The Concept of a Decision Calculus." The award is given to people who have made outstanding contributions to the science of marketing.

Although **Tom Jabine** has published several papers and reports, his name never appeared on a hard cover book—until this year. The book, published by the University of Pennsylvania Press, is: *Human Rights and Statistics: Getting the Record Straight*, a collection of papers that Tom co-edited. Tom's interest in human rights began about 15 years ago when the former director of Argentina's statistical office became one of the *desaparecidos*, a victim of the "Dirty War" of that period. Efforts on behalf of professional colleagues in several countries, who were victims of human rights violations, eventually led to the more general question of how the tools of Tom's profession could be used in efforts to promote worldwide observance of human rights. The book, which took several years to produce, is meant to provide some answers. Tom worked with a number of remarkable people, one of whom was Clyde Snow, a forensic pathologist from Oklahoma, who was recently in Bolivia trying to identify the remains of Butch Cassidy and the Sundance Kid.

Tom's human rights work is mainly an avocation. After retiring from Federal Service in 1980, he has had a fairly active and enjoyable career as a statistical consultant and plans to continue in this activity as long as circumstances permit.

Bob Crane, who earned a bachelor's in electrical engineering, later an MD, and who practiced coronary medicine before retiring, writes about the details of a third major incident with his heart. Last March Bob had an angina attack caused by blockage of his right coronary artery, which had not been involved in either of two prior coronary artery bypass procedures. This latest problem did not look repairable. As the pain intensified, Bob's cardiologist suggested stopping the anti-coagulant and allowing the damaged artery to clog and cause a small infarct. He hoped that the infarct would kill tissue that was causing the pain without killing Bob. Bob agreed to the actions and was given morphine to reduce his discomfort. Within 24 hours the infarct occurred and was confirmed by tests. For the rest of March, Bob was back at his computer and walking at the mall.

Then, in April, he learned he needed to have his prostate removed. He was awake while this was done in a four-hour operation. Despite some indications of cancer, they are waiting before beginning radiation therapy. As of June 1, Bob is working at home on his consulting activities for Sterling Drug, active as president of three local organizations, and walking.

Dick Snow retired in April 1990 and has barely

enough time for all his leisure activities, although he has enjoyed plenty of golf. He and his wife are living in North Carolina where he had been working.

Sanford Siegel died in November 1990. His wife says he often talked of his experiences as an undergraduate at MIT. He earned an MS and a PhD from the University of Chicago. He had been a long time resident of Honolulu where he worked in plant biology. . . . **Captain Winfred Berg** died last year at his home in Alexandria, Va. On behalf of our classmates, I extend our sympathy to the families of our classmates.—**Marty Billett**, secretary and president, 16 Greenwood Ave., Barrington, RI 02806, (401) 245-8963

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In reading the annual report of the Massachusetts General Hospital, I was delighted to find the names of **Alex d'Arbelof**, as trustee, and **Bill Edgerly**, as member of the Corporation of this world-class institution. Why my delight? Well, it's just that I owe me present state of sparkling good health to this very hospital whose excellence is due in part to the wise guidance provided by these two gentlemen. Alex is chairman and president of Teradyne, Inc., here in Boston while Bill retired just this past week as chairman and CEO of the State Street Bank and Trust Co.

A stunning photograph of Bill occupies almost the entire upper half of the front page of the business section of the *Boston Globe* of June 23, 1992,



Bill Edgerly, '49, as he appeared (albeit in color) on the front page of the Boston Globe's business section in June.

accompanying an article devoted to his historic achievements in the banking world, his 65th birthday, and the 200th anniversary of the bank's founding. In discussing his bank's position, Bill comments, "There are \$19 trillion of financial assets in the world" of which his bank has "a little over \$1 trillion in custody, or about five percent. I don't believe there is another institution that can make this claim."

Lee Granahan, Pawtucket, R.I., has been appointed to the board of directors of Lee Engineering Co., Inc. My 1989 copy of the *MIT Register* tells me that Lee was then assistant to the president of the American Ring Co. in East Providence, R.I. . . . **Herbert Hershenson** has been nominated as the next president of the Jewish Community Center of Greater New Haven, Conn. He is vice-president of Turbine Components Corp. of Branford, Connecticut. . . . **George Hatsopoulos**, founder, chairman, and president of Thermo Electron Corp. of Waltham, Mass., is one of four recip-

ients of the 1992 Beta Gamma Sigma Medallion for Entrepreneurship. This national award recognizes outstanding individuals who combine innovative business achievement with service to humanity. Hatsopoulos served on the mechanical engineering faculty from 1956 to 1962 and continued as a senior lecturer until 1990. His company, which manufactures environmental and analytical instruments, alternative-energy power plants and pre-packaged cogenerative systems, industrial process and power equipment and biomedical products, has sales of more than \$700 million and 5,000 employees.

Through a piece of returned mail marked "deceased," the Alumni 'ae Office has learned that **Lee E. Davies**, Menlo Park, Calif., died in 1991. . . . **Edward H. Kelley**, of Vista, Calif., "passed away November 27, 1991, while vacationing in Mexico" according to a note sent directly to me by his wife. I deeply regret the lack of any further information on these two men. If any of you know about either of them, I and the class would be most grateful for more information. Please write.—**Fletcher Eaton**, secretary, 42 Perry Dr., Needham, MA 02192, (617) 449-1614

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Robert W. Mann, our class president, retired as the Whitaker Professor of biomedical engineering on June 30 from MIT. Despite his retirement from teaching and from day-to-day operations of the Newman Laboratory, Bob plans to continue

research at MIT. He is working on a new kind of hip implant with more instrumentation—a project for which he has NIH grants to carry him through 1996. He will remain at the Institute as Emeritus Professor, and doctoral candidates working under his direction will continue until they finish their theses. Bob hopes to spend more time in his home at Lake Winnepesaukee, N.H., and do a little fishing and boating. He and his wife, Margaret, also own the former home of novelist Flannery O'Connor (Andalusia) in Milledgeville, Ga., where many of her best-known works were written. Flannery is a first cousin of Margaret, and they hope to spend additional time at that location each year. Best wishes to Bob and Margaret.

Thomas E. Shepard, associate director of Physical Plant at MIT, was elected VP, Metro West Chapter, of The Massachusetts Society of Professional Engineers for the 1992-93 Year. . . . **Robert Wilson** is now retired both from Exxon and his own consulting business. He reports that he

spends winters in Spain, spring trips in Europe, summer in Vermont, and the fall is a tough choice between the glorious colors of Vermont and the beauty of the sea and mountains of Spain.

Emile F. Harp retired August 1 as VP engineering, from Akzo Chemicals, Inc.—a Netherlands-based company where he had been employed for the last 24 years (20 in Chicago and 4 in Dobbs Ferry, N.Y.). He intends to remain active in consulting and project management and is starting a business to find employment for retired or unemployed engineers who wish to work on a temporary or full-time basis. Anyone interested may contact him at his home or his office in Danbury, Conn. He also plans to spend more time gardening, sailing, reading, and wood-working. . . . We regret our need to mention the death of **Alan T. Davenport** of Hempstead, N.C. Alan died November 9, 1991.

Please keep up the notes for your secretary. Thank you.—**John T. McKenna**, secretary, P.O. Box 376, Cummaquid, MA 02637

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Along with his wife, Rosemary, **Ed Bronstien** has been serving in Casablanca, Morocco, as a volunteer consultant with the International Executive Service Corps. Ed, the past president of the International Sleep Products Association, was recruited to assist a spring mattress manufacturer to improve quality and increase production. He accomplished both goals and also advised them on new product development. This was Ed's third project of this nature. . . . **Charles H. Spaulding** has moved from president to chairman of the Spaulding Investment Co. of Burlington, Mass.

Sadly, we received word that **Edward Barnes Stringham** passed away last April 4. Teddy entered MIT in 1945 but left to spend two years in the Army. He reentered Tech and graduated with a degree in management science. Shortly after graduation, he married Mary and joined the Penetryn System, Inc. He became president of the firm in 1961 and remained there until 1978. During his administration, the company grew from 40 to over 600 employees. He was responsible for many innovations in the sewer inspection and rehabilitation industry. Following sale of his company, he moved to Portsmouth, N.H. Showing his versatility, he received a master's degree in counseling from Lesley College in 1981. He used this skill to counsel prisoners at the Rockingham County Prison and handle emergency cases for Alcoholics Anonymous. His talent as an actor was apparent in roles in *Flags Over Portsmouth* and in a Japanese documentary filmed in Portsmouth. He also founded or was a major investor in over ten companies during this period. He opened the popular Molly Malone's restaurant. He certainly lived to the fullest and touched the hearts of many. We extend our sincerest condolences to Mary, his four sons, his daughter, and his four grandsons.—**Martin N. Greenfield**, secretary, 25 Darrell Dr., Randolph, MA 02368

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The MIT Student Financial Aid Office wrote class president **Dick Heitman** to tell him about the most recent Class of '52 Scholar, Lisa K. Arel, of Lee's Summit, Mo. At the time of writing last May, she was about to graduate in biology, with a 4.8 cum, was treasurer of the Class of '92, a varsity gymnast, and had a UROP job in a lab doing molecular neuro-biology. She plans to go to medical school. She needed the help of a scholarship as much as she deserved to get one, and we are duly reminded that our contributions make such help possible.

Merrill Baumann, a retired broker with Merrill Lynch in Boston, died last March 11. He was a graduate of Colgate as well as MIT, and served in

the Navy during the Korean war. He lived in Manchester, Mass., until he moved to Naples, Fla., in 1985. He is survived by his wife, Barbara, a daughter, and a son. . . . **Payson "Pete" Palmer**, of Peoria, Ill., died last April 2. He graduated from MIT in naval architecture and marine engineering, was a cadet engineer in the merchant marine, and graduated from Officer Candidate School in Newport, R.I., also in 1952. He served in the Navy during the Korean War, and retired as a lieutenant commander in 1970. He then worked in marine sales for Caterpillar, Inc., serving in Hong Kong from 1980 to 1984 and in Geneva from 1988 to 1992. The family suggested memorial contributions to the oncology unit of the hospital where he died. He is survived by his wife, Clarice, a daughter, two sons, and six grandchildren.

Ernest Capstick was one of two professors named as 1992 Outstanding Faculty Members at



Ernest Capstick

West Virginia Wesleyan College, where he is retiring from full-time teaching of chemistry. . . . The International Executive Service Corps recruited **Sandy Kaplan** to serve as a volunteer advisor to a construction firm in Ostroleka, Poland, helping them with marketing, new technology, and organization. Sandy and his wife, Phyllis, have since returned home to Newton, where he runs the Sanford Construction Co. . . . Slightly belated news from **Ralph Stahman** is that he retired in 1988 from the Environmental Protection Agency. He says he is keeping busy with travel, "senior" activities, and five grandchildren, and finds it a great life. . . . **Dan Lycan** retired from the U.S. Army Corps of Engineers after 29 years to start a second career as director of Public Works for Stafford County, Va., near Fredericksburg. He expects to retire again in a few years. Three of his children are married; he and Alice are the proud grandparents of two. His other daughter trains dolphins in Key Largo. Dan issues a general invitation to friends who are in the Washington, D.C., area to visit him.

Over 100 classmates, most accompanied by their spouses, came back to Tech last June for one or more events of our 40th Reunion. Among the highlights were a reception at the President Charles Vest's House, followed by a dinner and dancing at Walker Memorial. The next evening, after a buffet dinner, we joined the other reunion classes for Tech Night at the Pops, where Harry Ellis Dickson seemed to enjoy the performance he conducted as much as the audience did. At the Technology Day luncheon the next day, Reunion Chairman **Bob Lurie**, artfully disguised as a beaver, or something, ran in with the amount when it was time to announce our class gift: approximately \$3.3 million. At Cape Cod that evening, the stormy weather did not penetrate into the dining room of the Chatham Bars Inn, where the after-dinner speaker, Professor Ron Lantianis, spoke about the MIT K-12 education initiative program that he heads. Without claiming to have the answer to the problem of education, he suggested that parental attitudes play a key role. More than one caring parent of an under-achieving child wondered if the problem were not more complicated than that. The final evening was celebrated with a clam bake. On behalf of the nominating committee, **Ed Margulies** abandoned his lobster to announce its choices for class officers for the next five years.

Bob Lurie was named class president; **Stan Sydney** as both reunion chairman and class agent, a post he has now held for 25 years; and **Dick Lacey** to continue as secretary. Without objection, or acclamation for that matter, the nominees were apparently elected. The ceremonies then turned to

giving recognition to classmates for outstanding achievement. Passing quickly over awards for mere merit, **Stan Sydney** for most service to the class and **Joe Moore** for fund raising, **Dick Heitman** called up several promising candidates for the prize for having the least hair. **Mike Goldman** may have thought he stood a good chance, but **Mike Lubin** won overwhelmingly. Other honorees included **Dana Mayo** for the greatest discrepancy in height between husband and wife, **Bruno Cagna** for being the longest retired (11 years), **Bill McLaughlin** for having married the most times, **Manuel Liberman** for having the most great-grandchildren (2), **Bob Norton** for having the most grandchildren (17), and **Dan Anderson** for having run the most marathons (115 in 20 years). Faithful reunion attendee **Ray Wong** won again for having come the farthest (Kuala Lumpur), and **Paul Lux** won for coming from the most inland point (St. Louis). **Steve Boley** was honored for having the most jokes, **Bob Lurie** for being the most computer-happy, and **Dick Silverman** for being the most born-again '52er. After dinner, Associate Provost Jay Keyser, whose band had provided musical entertainment, gave an illustrated talk on great MIT hacks through the years. The audience, undergraduates at heart thinly disguised as mature citizens, liked them all but seemed to prefer the mischief done in our day.—**Richard F. Lacey**, secretary, 2340 Cowper St., Palo Alto, CA 94301

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40th Reunion

By the time you read this, you will have received at least one mailing from MIT regarding the reunion next year. Planning was started with a visit to Tech in February by **Marty Wohl**, **Dick Linde**, and myself. Since I haven't seen the planned mailings (at this date they are being drafted), I'll assume that you know what the plans are.

In addition to a few days at Tech to reinforce old memories and get plugged into the latest goings-on, we are tentatively planning to return to the location of one of our previous reunions, Chatham Bars. I remember having a great time. I understand the hotel and facilities have been redone. I'm planning to visit there in the fall on vacation, and I'll subsequently give you my impressions in a future column.

Let me say a few words regarding contributions to the Alumni/ae Fund. The upcoming reunion is our 40th, a major one. We have been raising families and paying for college educations for our children during the past fund campaigns. I was constrained in prior years, what with educating six of my seven children, but that is now over. I suspect that most of you are also breathing a sigh of relief and have started planning for retirement as I have.

However, you have probably all read about the state of education today and have some understanding of the growing need for quality education for the young people of this nation. Our country needs all of the quality engineers, scientists, and the other educated professionals that MIT has been putting out for these many years. The cost of education at the best schools is high and keeps increasing.

The ability of talented young people with even modest resources to afford a quality education is limited. Your contribution to the Alumni/ae Fund in conjunction with the Class of '53 40th Reunion class gift will help in making an MIT education available to many deserving young scholars who might otherwise not be able to afford it. I'm planning to increase my contribution and I hope you will too.

Now, on with the few items I have. **Caroline Herzenberg**, of the Argonne National Laboratory in Argonne, Ill., recently received an appointment as a distinguished visiting professor at the State University of New York (SUNY) at Plattsburg, N.Y. During the annual fall convocation,

SUNY/Plattsburg awarded her an honorary doctoral degree. The citation refers not only to accomplishments in science and engineering but also to concern for issues relating to women in science. She also presented an invited paper ("Women Scientists of the Manhattan Project") to the American Association for the Advancement of Science in Chicago in February 1992 in the symposium, "Nuclear Energy: A Half Century and Beyond."

Robert Colton reports that his three sons are progressing rapidly in their careers. Son Jon is an associate professor of mechanical engineering at GIT. He recently was awarded tenure. Son Larry is a patent attorney at Hurt, Richardson et. al. in Atlanta, Ga. Son Mike is studying for an MS in security management at GWU.

On the sad side, **Morris B. Carter** of Columbia, Tenn., died near the end of November 1991. He was a native of Canon City, Colo., and served in the Navy in World War II aboard the U.S.S. *Boxer*. During his career at Union Carbide, he received several patents in the development of high temperature graphite. He retired from Union Carbide in 1985 as a senior research engineer.

One final note. We are looking for nominations for the class officer positions. If you would like to volunteer or have a classmate to nominate, please send your or his/her name and address to me at the address at the end of these notes. Please check with your classmate before nominating him/her. All those sending in their class dues will be able to vote, and the winners will be announced at the reunion. So long til next time.—**Gilbert D. Gardner**, secretary, 1200 Trinity Dr., Alexandria, VA 22314, (703) 461-0331

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Class news is rather scarce—drop me a note by mail or fax (203) 576-4983 about your latest escapades. Other class members are interested.

We have heard from **Bob Anslow**. He and Carol celebrated their 35th anniversary last spring with a trip to Hawaii. They live in Newport Beach, Calif. . . . Word has come from Venezuela that **Alfredo Peralta-Maninat** became a grandfather in August 1991. Jose Antonio is the son of his daughter Maria and her husband, both of whom are lawyers. That parallels the Eigel experience. Our first grandchild, Andrew Jerome, was born in December 1991, and our daughter Mary and her husband are both lawyers. That's scary.—**Edwin G. Eigel, Jr.**, secretary, 33 Pepperbush Lane, Fairfield, CT 06430

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Robert J. Papa, Course VIII, was honored by the IEEE (Institute of Electronics and Electrical Engineers) with nomination to Fellow, recognizing his unusual distinction in the profession. Dr. Papa's illustrious career was chronicled in *The Reflector*, the IEEE's newsletter. After receiving SB and SM degrees in physics from MIT, he earned a PhD in applied physics from Harvard University in 1972. He was a Fulbright Scholar in France, then taught courses in electromagnetic theory and atomic physics at MIT from 1956 to 1959. He subsequently worked at the MIT Research Laboratory of Electronics, the Geophysics Corp. of America, and the Air Force Cambridge Research Laboratories in various aspects of electromagnetic (EM) wave propagation and related physics and electronics issues. From 1976 to the present, he has been employed at the Rome Laboratory (formerly Rome Air Development Center), developing radar clutter models and investigating the scattering of EM waves from rough surfaces. Dr. Papa is the author or co-author of over 20 technical papers, two books, and over 60 technical reports. He has received over 20 scientific achievement awards, including the Air Force Systems Command Cer-

tificate of Merit, and has been active in numerous IEEE chapter and publication activities. He is also a member of the American Physical Society, the International Radio Science URSI Commission B, and Sigma Xi.

Robert L. White, Course VI, senior chief at Draper Labs, also made the news, appearing in the Draper Laboratory Notes as presenting, on behalf of the National Academy of Engineering of which he is president, the 1991 Draper Prize to Sir Frank Whittle and Dr. Hans von Ohain, simultaneous inventors of the jet engine.

We regret having to report the death of **Richard C. Varney**, Course I, in March 1992. Richard remained in Mendon, Mass., where he had lived while at MIT, and worked at Varney Bros. Sand and Gravel for over 35 years, most recently as treasurer, as well as owning and operating Varney Bros. Farm in Mendon. He was a U.S. Army veteran of the Korean War and remained a member of the Society of American Military Engineers. He was active in the Montgomery Lodge of Masons, the York Rite Bodies, the Valley of Boston Scottish Rite Bodies, the Aleppo Shrine, and the Milford Rotary; he was also past chairman of the Zoning Board of Appeals, a trustee of the Milford-Whitinsville Regional Hospital, and a former VP of the Milford National Bank and Trust Co. Besides his wife, Linda, he leaves a son, two daughters, two stepdaughters, and four grandchildren.

Please note the change of address for one of your co-secretaries. **Roy Salzman**, Course VI, Delta Upsilon, and Doris have finally sold their beloved house in Carlisle, Mass., and moved in two directions simultaneously. Part of their household went to their newly built future retirement home in Rockport, Maine, where they hope to spend some long weekends and vacation time sailing on Penobscot Bay, enjoying their ocean view, and getting ready for retirement in two-three years. Meanwhile, however, they will be living in Bethesda, Md., while Roy completes an assignment for the U.S. Postal Service, on behalf of Arthur D. Little. ADL has an office in Washington dedicated to conducting and managing research and development projects for the USPS. Roy is managing the planning and design of a potentially massive re-engineering and automation program for the 250 or so mail processing facilities in the Postal Service, to be deployed (hopefully) in the post-1995 time period. They would welcome visitors or callers, (301) 564-5663, if anyone is in the Washington area.—Co-secretaries: **Roy Salzman**, 4715 Franklin St., Bethesda, MD 20814; **James H. Eacker**, 3619 Folly Quarter Rd., Ellicott City, MD 21042

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Technology Day, June 5, was a very special day. I enjoyed the day-long program and talked with **Lloyd Beckett**, **Ron Massa** and **Bill Northfield**. **Walter Frey** attended on Thursday, June 4. I strongly recommend attending the annual Technology Day programs in the future.

Paul Cianci reports from Niantic, Conn., that he works in his consulting structural engineering office part-time now. The office designs all types of structures, including high-rise buildings. He also provides investigative reports for property transfers or litigation. Paul presented a paper entitled "Radial Folded Plates." He further states that since his open heart surgery 15 years ago he and his wife totally changed their lifestyle to a healthy, unpressured, family-oriented way of life. Paul enjoys tennis, sailing, and swimming, and does volunteer work in the cardiovascular field. . . . **John Cowles** of Potomac, Md., works for TRW in Vienna, Va., as a systems engineer involved in a civilian radioactive waste management program with the Department of Energy. John is active with the MIT Club in Washington, D.C., with their annual fund raising efforts. Wife, Diana, is active with the National

Portrait Gallery; son Stephen graduated Class of '88 from Duke and is teaching English in Paris; daughter Tina is a freelance journalist in broadcasting in Washington, D.C. (she has degrees from Wellesley and Northwestern). Son Christopher is a Cornell graduate and is with Arthur Anderson in the Advanced Systems Group. John likes to travel and he toured Austria and Hungary last summer. . . . **John Cronin** is the Controller of Pfizer's Corporate Information Services Division in New York. He and his wife, Lois, spend the summers sailing on Long Island Sound. Daughter Tenley is manager of telecommunications for Brown Brothers Harriman in New York city; daughter Christine is a VP at Chase Manhattan Bank in New York; and son Douglas is a tax consultant with Arthur Anderson, Hartford, Conn.

I am sorry to report that **Harold Rothstein** of San Francisco, Calif., died in the spring of 1991. Send news to: **Ralph A. Kohl**, co-secretary, 54 Bound Brook Rd., Newton, MA 02161

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This is the first set of notes to be written since the 35th Reunion. Those of us who came back to MIT had a good time and even the weather behaved. Thanks go to **Bill Noz** and **Paul Nathan** for planning and organizing the reunion and to **Hank Salzhauer** for an especially important job of leading the successful fund-raising efforts for our Class Gift. Plan to come to the 40th!

As we start a new five-year cycle, a few words about these notes are in order. I can include only what I know about, and that means what I get from you or from the Alumni/ae Association. They are very good about forwarding information you send or material they get from clippings. However, the class would welcome additional news items from you. Please send them to me at my address; I will do my best to get them in. Note that there is a lead time of several months, e.g., these notes are being prepared in mid-June for a June 26 deadline.

One of the highlights of the reunion was the opportunity to meet the first holder of the Class of 1957 Career Development Professorship, **Michael Rubner** of the Department of Materials Science and Engineering. His main interests are in polymers, about which he was both informative and entertaining. For many of us, his most interesting comments had to do with the impact of the chair on his teaching and his career. We were surprised to learn that MIT expects engineering faculty to raise from outside sources all of their summer salaries and 40 percent of their academic-year salaries. The holder of the chair, however, is relieved of most of the obligation to raise the academic-year salary, which allowed Professor Rubner the time to expand his interests and develop research in new areas. In addition, the chair provided some \$10,000 additional expenses, which he had used to buy equipment, support some student research, and pay for his students to travel to conferences. The general consensus was that the donations from the Class of 1957 have had a significant impact on both MIT and one professor's career. Thanks in part to that support, he has received tenure. . . . Starting July 1, Professor Lynn Stein of the Department of Electrical Engineering and Computer Science will hold the Class of 1957 Career Development Professorship; I will describe her activities in future notes.

A few months ago I reported that **Art Bergles** and **Ray Stata** had been elected to the National Academy of Engineering. I did not know that **Alexander MacLachlan** had also been elected at the same time. Congratulations and apologies for missing him the first time around. . . . **Tom Ahrens** was recently elected to the National Academy of Science. This represents real approbation from his colleagues, and Tom has become sufficiently eminent that I even run into his name in

articles. Congratulations.

In May, **Gordon Bell** received the John von Neumann Medal from the IEEE. He was recognized for innovative contribution to computer architecture and design. Gordon led the development of the DEC VAX minicomputers. His achievements include start-ups at Encore Computer Co. and Ardent Computer. He is a member of the National Academy of Engineering, a fellow of IEEE, and a fellow of the American Association for the Advancement of Science.

Don Norman, well known for his book *The Design of Everyday Things*, has written another, *Turn Signals Are the Facial Expressions of Automobiles*. The book furthers his examination of the innate perversity of inanimate objects. . . . Finally, the class will be saddened to learn that **Kenneth Peterson** and **John Murray** have passed away.—**John T. Christian**, secretary, 23 Fredana Rd., Waban, MA 02168

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35th Reunion

Step right up folks! It's reunion time again. Our 35th to be exact, but who's counting anyway? At any rate, it's time to mark June 3-6, 1993, on your calendar for the "BIG ONE." More details will be coming soon from the Reunion Committee.

At the University at Stony Brook this past June, **Jim Simons** received an honorary doctor of humane letters degree. Jim was on the faculty at the university from 1968 to 1974 and was the first director of the Division of Mathematical Sciences. He left academia for private industry in 1974 and is currently the president of Renaissance Technologies Corp. He has maintained close ties with the university, serving on the board of directors of the Stony Brook Foundation since 1986 and serving as its chairman since 1988.

Out on Nantucket Island, **Helmut Weymar** has found time to become involved with conservation efforts to preserve the Sankaty lighthouse. Situated on a bluff being steadily eroded by tides and storms, the lighthouse has become a classic confrontation between homeowners, preservationists, and the U.S. Coast Guard. Stay tuned.

And speaking of staying tuned, guess what has become the most popular show on National Public Radio? No, it's not This Old House or even Garrison Keillor's now discontinued Prairie Home Companion. It's Car Talk, hosted by the class of '58's very own **Tom Magliozzi** and his brother Ray, class of '72, a.k.a. Click and Clack, the Tappet Brothers. Looks like the horseless carriage wins again!

William Cooper writes that he is now group leader for magnetic fusion energy at the Lawrence Berkeley Laboratory. . . . **James French** is now providing consulting services to both the U.S. Air Force and private company clients in the areas of spacecraft design, launch vehicles, and propulsion systems. . . . **Shmouel Winograd** was recently elected to the Council of the American Philosophical Society. This society, which ranks among the country's oldest and most prestigious, was originally founded by Benjamin Franklin and some of his friends. In 1993, the Society will celebrate its 250th Anniversary and the birth of its third president, Thomas Jefferson.

Well, after much searching, Nancy and I finally found a house here in the New Haven area and moved in at the end of August. Get those address books out once more, friends, and while you're noting the change be sure to send along some news for a future column.—**Mike Brose**, secretary, 75 Swarthmore St., Hamden, CT 06517

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Please send news for this column to: **Allan S. Bufferd**, secretary, Office of the Treasurer, MIT 238 Main St., Suite 200, Cambridge, MA 02142

Congratulations are in order for **Howard L. Rosenthal** who was recently elected a fellow of the American Academy of Arts and Sciences. Howard, currently a faculty member of Carnegie-Mellon University, was recognized for his distinguished contributions in political science.

In the July column, I reported that **Robert Walsh** had recently retired from the Air Force Reserve. Bob has sent the following, which I did not have when I wrote about him earlier. Bob reports that daughter Maria graduated magna cum laude in chemistry from Arizona State University having previously received a degree in biology from McGill. Maria is now in law school at ASU. Robert II is finishing his third year at Claremont McKenna, and Amy had finished her third year at Xavier College Prep. Bob says that he and his wife, Angela, enjoy the warm (?) 120 degree weather in Arizona, but do look forward to returning to Rhode Island for the summer.

In last month's column, I reported the selection of our second Class of 1960 Fellow, Professor **Thomas Magnanti**. In announcing Professor Magnanti's selection, Provost Mark Wrighton recognized Magnanti's leadership and innovation in the Leaders for Manufacturing Program, as well as his service to the education community. The \$40,000 stipend is intended to provide flexibility to pursue new ideas and opportunities of professional interest to Magnanti, particularly in preparing students for productive and rewarding careers. Professor Magnanti, also the George Eastman Professor of Management Science, is a leader in the field of mathematical programming, with particular interests in combinatorial and network optimization. He has applied his research to transportation planning and manufacturing operations management. The class of 1960 is proud to have this outstanding, conscientious teacher as a fellow.

I sadly report that **Seymour Gordimer** died on May 8 leaving his wife, Lynda, and two sons. Seymour was a Course XV graduate and had spent more than 20 years on the staff of the EPA. Our sympathy goes out to Lynda and sons, Douglas and Richard.

Please help your secretary by sending a note to me or by penning a few lines on the card with your Alumni/ae Fund contribution. Thanks.—**Frank A. Tapparo**, secretary and class agent, 15 S. Montague St., Arlington, VA 22204

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I got a very moving and interesting letter from **Pete Buttner** a couple of days ago. He is in the midst of a five-year struggle with mouth cancer, using a variety of standard medical and non-traditional therapies. They include radiation therapy, surgery, Hoxsey Tonic, and a method that involves audio frequencies applied to the tumor. His physicians say that his "prognosis" is death in 6 to 12 months (from June 1992). On the other hand, he writes, "my spirits are excellent and I have really supportive family and friends to help keep them. . . . If the fuse is really that short without the right combination of alternative therapies, of which I know there is at least one combination that will cure me, then I'm really coming down to the last 40 strokes, to use the metaphor I presented in my crew talk five years ago. If any of our classmates or other chance readers out there has something to offer or suggest, I would really appreciate hearing about it. I won't be able to try everything, but perhaps the ingredient I really need is still waiting out there." Pete's address: 281 Jacksonville Stage, Green River, VT 05301-7006.

My apologies for missing two of the summer columns. My mind was otherwise occupied. My biotech firm looked over its balance sheet, saw a big quarterly loss, and decided to abandon government-sponsored programs. Since that was my specialty. . . . I have learned many things. What

happens at the Cambridge unemployment office (they are very pleasant, sensitive folks), how many ways a rejection letter can be phrased, how useful a laser printer becomes when it's not available, the value of outplacement firms (not much), the concept of networking. Because of a pretty large nest egg and severance package I have about a year to look around. Judging from six weeks of looking, two offers, and six interviews, it is likely I will be employed by the time you read this.

Bill Lenoir was unemployed for a couple of weeks earlier this year. He had been running



Bill Lenoir

NASA's space shuttle program (at \$8 billion/year) but with the shakeup over there he found it expedient to resign in March. On the first of May he was paying taxes again. Now he is VP at Booz, Allen, and Hamilton, where he will run their Applied Systems Division. The other day he was voted a member of the MIT Corporation.

I got a note from **Gus Solomons**. He continues the struggle of running a dance company in New York. Survival in that business means success. In July and August, Gus danced at the Glimmer Glass Opera House (Cooperstown, N.Y.) as part of a new production of Mozart's *Magic Flute*. His group, The Solomons Company Dance, performed in the Lincoln Center Out-Of-Doors festival last August. Gus got a New York Foundation of the Arts Choreography Fellowship last April on top of an NEA Company Grant for 1992-93. And that's only part of his honors and activities. Congratulations and thanks to Gus for giving the Class a bit of class.

Congratulations are also in order to **Max Keck** who just became dean of arts and sciences at



Max Keck

Xavier University in Cincinnati. Max moved over from Rockhurst College in Kansas City where he had been academic VP. He is a solid state physicist, but has blossomed as a biologist investigating human visual perception.

Marshall Greenspan is in Norwalk, Conn., where he continues slaving for Norden Systems by designing high resolution airborne radar. His kids are in Boston, though. Daughter Shelley is at BU and son Mannie established the NoBull [sic] realty company on Mass. Ave. . . . **Henri Schnurmann** doesn't have job problems (I hope). He is finishing up 30 years at IBM where he is a senior technical staff member. Along the way he invented lots of things and got involved in the details of patenting. So he decided to try becoming a patent attorney. He passed the patent bar exam and now can practice law before the U.S. Patent and Trademarks Office. (No mention of Law School in Henri's letter!) His daughter Esther made him a grandfather for the third time. Still at home are his second daughter Debbie, a teacher, and son David. Henri wonders whether "anyone is thinking of retiring?" . . . **Eric Mudama** writes that "Betsy and our two children, Eric and Sarah, will be joining me in the Bay Area this summer after Eric's high school graduation. Eric has been accepted to MIT and is interested in pursuing biomedical engineering. I recently became CEO of a small Bay Area electronics company, Orion Instruments. Congratulations, Eric (both of them)!"

Ellen Zarren (Bennett's better half) writes that "Two AEPi, class of '61, couples who came to our Phyllis's and Zohar's wedding in Jerusalem from

the greatest distance were left out of the class column. Eleanor and **Harry Bluestein** traveled from La Jolla, Calif., and Phillips and **Howard Rubin** came from Oak Park, Ill. We all sure did some major celebrating!"

I went over to visit **Gordon Baty** at his venture capital company, Zero Stage Capital, in Cambridge the other day. It's very fancy with a great view of the Charles and the Boston skyline. The company is mostly interested in start-ups of a technical bent. They don't make major investments but help good ideas get off the ground. Gordon knows what that means since he started up several small companies—some rousing successes, some less impressive. Out of that experience he wrote a terrific book—*Entrepreneurship in the Eighties*—that sold well, so the publisher (Prentice Hall) suggested a revision. Now you can go to your corner book shop and order *Entrepreneurship in the Nineties*. Gordon denies that he will revise it for the next decade. He can't figure out what to call it! The Baty family is pretty busy, too. Gordon's wife, Kate, runs the MIT International Student Host Program. Daughter Janna is an opera singer working towards a master's degree at Yale. Son Peter is a junior at University of Vermont in civil engineering. To keep out of trouble, Gordon plays the tuba in Lexington town band and in a local Dixieland group. Whew!

You may recall that our class gifts subsidize several scholarships. This year's recipients are an interesting group. They are men and women, engineers and scientists, dorm and frat, native American and immigrant. One set (the Howard R. and Helen Bartlett Scholarship Fund) went to four Burton House inhabitants; two juniors and two seniors. Another (the Alpha Epsilon Pi Fund) helped two juniors from that fraternity. The Clark Swannack Memorial Fund scholarships went to another junior. Finally, scholarships from the Class of 1961 Student Aid Fund helped a couple of seniors and one junior. We should pat ourselves on the backs. These gifts are a whole lot better than a bench or class room. They don't come with a plaque, though. We are working quietly, but very effectively, toward a better world.

Bill Hecht reports the Toot made its goal of \$700 million in the latest (but not last) five-year campaign. Is there really a recession? Speaking of campaigns, Bill's three children were all involved in last year's Desert Storm campaign. Capt. Olivia Hecht came back with a bronze star but won't say how she got it. She's in the Army's 123rd support battalion, which provided medical logistics during the war. She is now stationed in Maryland at Ft. George Meade. Capt. William Hecht, Jr., was a radar navigator (bombardier) on a B-52, which made over 30 runs out of Jeddah into Iraq and Kuwait. He is back stationed in Rome, N.Y., at Griffith Air Force Base. Finally there is Ms. Marcia Hecht. Her involvement in the war was to join in a protest march in Boston against the invasion. She is an assistant editor at Madison Publishing, working on HMO newsletters. Quite a family, Bill!—**Andrew Braun**, secretary, 464 Heath St., Chestnut Hill, MA 02167

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The 30th Reunion was a huge success both intellectually and socially. The Class of 1962 made a major contribution to the intellectual success of all class reunions by sponsoring a "Forum on Policy Issues in K-12 Education." This consisted of a panel of businessmen, teachers, legislators, and news media types discussing the problems and proposed solutions for K-12 education in Massachusetts and in the U.S. Discussion included public versus private education, training of school principals and teachers, motivation of students and parents, and the general attitude of the U.S. public toward education. The keynote speaker was former U.S. Senator Paul Tsongas, who convinced us all that when you discuss the real problems of the U.S. and show citizens what the difficult choices are ahead, it is difficult to get

elected to national office.

The social events were wonderful, starting with "Tech Night at the Pops" on Thursday with associated parties and a first-class dinner on Friday night where **Bill Koch** gave a talk and video presentation on how Team America³ won the America's Cup. Also in attendance was **Jim Draper**, another classmate who played a key role in the America's Cup victory. It seems that a significant role was played in both hull and sail design for America³ by the MIT Departments of Ocean Engineering (XIII) and Aeronautics and Astronautics (XVI). Bill Koch stressed that teamwork was the most important factor in the America's Cup victory, and the victory was also a tribute to his training at MIT and the technical expertise available from MIT, its faculty, and graduates.

MIT 1962 was the oldest participating class in the Reunion Challenge Games on Saturday afternoon, and we took the pledge to continue to participate every five years as long as at least six of us could hobble around in sacks, throw water balloons, design mechanical gadgets, remember MIT trivia, and tug on the end of a large rope. **Hersch Clopper** was our team leader for the Field events, and while our victories were nowhere near as spectacular as the America's Cup, we did engage in all events but volleyball due to the late arrival of the required quorum for participation.

Saturday night brought back the '50s and '60s as we dined in style at the Alexander Parris Room at Faneuil Hall marketplace in Boston and danced the night away to most of the favorite tunes of our college years. Sunday Brunch at the Charles Hotel in Harvard Square was a good time to relax and say goodbye to friends we hope to see again in five more years. If you missed the 30th, don't miss our 35th. We intend to have another fun weekend celebrating. It sure was nice to see some of our classmates and friends who did not make the 25th but really enjoyed the 30th. I'll have more on who attended the 30th in next month's column.

MIT 1962 now has an e-mail network operating through the MIT Computer Systems. Classmates who were at the 30th Reunion were requested to join the network by sending the message text: SUB MIT1962 to LISTSERV@MITVMA.MIT.EDU on the Internet system or LISTSERV@MITVMA on the Bitnet system. If you can't figure that out, just send a message to MIT1962@MITVMA.MIT.EDU or to HMCCARL@ENGYSYS.ENG.UAB.EDU, and we'll put you on the e-mail network. We would like all classmates with e-mail connections and the ability to communicate with Internet/Bitnet/Telnet to sign up on the network. The Alumni/ae Association will be requesting your e-mail addresses and setting up a master system for all classes, but we are pioneering the effort with our own network as a trial run for the rest of the alumni/alumnae. Please put through a message so that we can read the routing to be sure your e-mail address works with the Internet system. If you have given Hank McCarl your e-mail address and have not received an acknowledgement from MIT1962, please try to determine how you can send an e-mail message to Hank at HMCCARL@ENGYSYS.ENG.UAB.EDU on Internet.

As always, if you don't use the high tech communications, just send a note or card via the U.S. Postal Service to: **Hank McCarl**, Secretary, P. O. Box 352, Birmingham, AL 35201-0352

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As you know, I get both letters and press releases to publish. While I prefer the intimacy of the letters, I'll take anything I can get. But I will start with a letter. **Ron Jansen** has, believe it or not, retired. He had worked many years for Digital, and they offered early out with lots of bennies (is that how you spell it?). He says, "My short-term plans involve the beach and sleeping late. My long-term plan is to develop a long-term plan."

His family is doing well. His wife, the former **Christine Huk**, also of our class, works at Tech in the Technology Licensing Office. Their son Rolf is working in the field of biotechnology on the West Coast. Their daughter Monika just graduated Vas-sar and is now in grad school at Cornell. This old retired fellow just ran the Boston Marathon for the first time! You can reach Ron by e-mail, he says, at ron.beach.asleep.retired.unreachable. If that does not reach him, try 11 Evans Rd., Brookline, MA 02146.

I also got a note from **Bill Zoller**, who has just gotten a master's in Rehab Counseling from the University of South Florida. Still, he continues his architecture practice. He is also an environmental activist, seeking to resist fast-growth development pressures, especially near Sarasota.

In 1780 John Adams, later president, and some other leaders of the then young republic started the American Academy of Arts and Sciences. It was "to cultivate every art and science which may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people." There are some 3,200 fellows plus 500 honorary (foreign) members. One fellow just elected is **Frank Shu**, now at UC/Berkeley. Illustrious members of the new class of (205) fellows include Bill Gates from Microsoft, Joseph Murray (1990 Nobel in medicine), novelist Joyce Carol Oates, musicians Seiji Ozawa, Leonard Slatkin, and Leon Fleisher, and so on. Congratulations to Frank.

You may (or may not) know that our class sponsors a substantial scholarship fund. The 1991-92 recipients are David Wu and Hye Kyung Lee, both continued from last year. David is a senior in electrical engineering and computer science. He is in the coop program with Hewlett Packard, and sings in the MIT Concert Choir. Ms. Lee has just graduated but plans to continue for a doctorate. She, too, is in the Choir, but is also active in inter-collegiate volleyball.—**Phil Marcus**, secretary, 3410 Orange Grove Ct., Ellicott City, MD 21043, (410)-750-0184, CompuServe 72047,333, Inter-net: 72047.333@compuserve.com.

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It is with great regret that I inform you of the death of our classmate, **George Piotrowski**, a former roommate of mine and a truly good friend. George succumbed following a long, courageous, and sometimes very painful struggle with cancer. He is survived by his widow, Linda, and their two sons, all of whom live in Gainesville, Fla. George earned an SB and an SM in Course II and a PhD from Case-Western Reserve University. He was an associate professor in the Department of Mechanical Engineering at the University of Florida and an assistant professor in the Department of Orthopaedic Surgery. In 1983 George founded Design Analysis Services Co., Inc., an engineering consultant firm. He was an avid model railroader, train buff, skier, and family man. George cared about society at large, as demonstrated by his support for many humanitarian causes, and cared about people as individuals. All who knew George would describe him as special. A memorial scholarship has been established in his name at that Department of Mechanical Engineering, University of Florida, Gainesville, FL 32610.

I am pleased to note that several of our classmates have earned honors for their professional accomplishments. . . . **Pete Ordeshook** was elected a fellow of the American Academy of Arts and Sciences in the political science section. He is currently on the faculty at Cal Tech. . . . **Bob Weinberg** is one of seven recipients of the 1992 Gairdner Foundation International Awards. He was selected for "elucidating genetic events leading to the development of cancer." . . . **Michael Lysaght** was named a fellow of the American Institute of Medical and Biological Engineering. He is VP for R&D at Cellular Transplants, Inc., in

Providence, R.I., and is an adjunct associate professor of biomaterials at Brown University.

The losses that we suffer make us that much more aware of what we have. Send a note and use this column to share news and information about where you are and what you are doing. Your classmates and friends will appreciate it.—**Joe Kasper**, secretary, RR 2, Box 4, Norwich, VT 05055

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Dick Schmalensee was on the podium for Technology Day, June 5. Dick spoke on the changes in governmental control—in particular that government is controlling today more through regulation than through direct economic intervention. . . .

Wyckham Seelig was at the conference, as was **Ron Newbower**. Wyck was impressed with MIT's interest in K-12 education and the sense Dick left that education is not merely a money problem. Wyck reports that he is director of Manufacturing Planning for AT&T and sings in a Masterwork Chorus annually at Carnegie Hall. His son Eric is entering MIT this fall and his daughter Sara is a freshman in high school.

Bill Morgan also attended the alumni weekend, but only to go to the Boston Pops. Bill consults in industrial-scale food equipment with Arthur D. Little. He has a boy, 10, and a girl, 2, and reports an active life as a soccer coach. Bill came back to Boston two years ago after a career with Lipton, R.J. Reynolds, and Nabisco. . . . **Peter Gerstenberger** also went to the Boston Pops. Peter's firm provides strategic consulting for a wide range of service and manufacturing companies. He and wife Maureen celebrated their 25th anniversary last year. Their daughter graduated from Colby in biochemistry and has signed on with NIH for two years to do research, and their 11-year-old son is into little league. Peter flies his own plane, scuba dives when possible, and takes the family skiing regularly.

By the time this is published, **Jim Falender** will be in Belgium managing Dow-Corning's technical activities. Jim has lived almost his entire post-MIT life in Midland, Tex., so this is a big move for them. He reports a daughter at the University of Michigan. . . . I saw **Dave Manalan** recently. He's moving into the environmental field with a vengeance, focused on helping small companies that need OSHA, FDA, and environmental support.

Finally, I sat next to a very pleasant young man at a recent conference, and when we traded cards, I found that he was **Andre Toth's** son Tibor. I think I'm feeling my age!—**George McKinney**, secretary, 33 Old Orchard Rd., Chestnut Hill, MA 02167, (617) 890-5771

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As you are all aware, our class established the Doc Edgerton Scholarship as part of our 25th Reunion class gift. The first recipient of the scholarship will be Miss Sacharita Sahu, a member of the class of '92 majoring in mechanical engineering. Miss Sahu is a freshmen advisor in her dorm, a member of Tau Beta Pi, and serves as publicity director of Sangam, the association of Indian students at MIT. She plans to continue on for a PhD with research and teaching as career goals.

John Dawson writes that he has been a full professor of math at Penn State for nearly seven years. He is now on sabbatical working on a biography of Kurt Gödel and is also continuing as co-editor of Gödel's *Collected Works*, a long-term project now on the third of four volumes. He and Cheryl have just celebrated their 22nd anniversary. . . . **Michael Adler** shares his two big events of the year—son Joseph finally chose a college and will enter MIT's Class of '96, and he and Marcia are having a house constructed on Nantucket. The

distance and travel difficulties made it a little more interesting than normal house building. . . . **David Ljungquist** has returned to Nitech as manager of International Marketing after a year of market research consulting. He and his family moved back to Cheshire, Conn., last year and love it. Daughter Debbie was married last year. Our daughter, Cheryl, has returned to MIT for a doctorate in materials, so we get to visit Cambridge for another two or three years.

From **Lawrence Daley** comes news of the past 26 years. He got his advanced degrees from Cornell then worked for a variety of companies before joining IBM in Endicott, N.Y., in 1981. He then returned to school for an SM in computer science. Under IBM's Faculty Loan Program he taught at Hampton University in Hampton, Va., for a year, enjoyed the south so transferred to IBM in Lexington, Ky. IBM sold his division so he has returned to Hampton as associate professor of computer science. He has a wife, Kathy, and two sons, Marcus and Matthew. . . . **Jim Kester** is five years retired from Air Force service, started "so many moons ago" in MIT AFROTC. He is currently senior simulation engineer on a project to model radar systems in software, still in Dayton, Ohio. His employer, Softech, was founded by two MIT engineers. His daughter, Deborah, who was married last year, has a master's in counseling and is about to be fully certified in drug rehab counseling. Son Robert, 12, tends more to art than engineering.

Earlier this year I mentioned that **Dennis Overbye** had written a book, *Lonely Hearts of the Cosmos*. It is the story of man's quest to understand the universe, beginning with Hubble and chronicling the personal stories of Allan Sandage, Stephen Hawking, and Beatrice Tinsley, among others. In recognition of its excellence, he has now received the 1992 American Institute of Physics Science Writing Award in Physics and Astronomy. . . . Carrying further the work of those scientists, **George F. Smoot**, of the Lawrence Berkeley Laboratory, electrified the world of physics with the news that his team had detected faint density fluctuations in the afterglow of radiation from the birth of the cosmos, the "Big Bang" theory of the beginning of time and space. His discovery provides an explanation for the "lumpiness" of the universe that had not been explained by the Big Bang theory. I don't think we can surpass that stellar news so... enjoyed all the letters... keep writing.—**Eleanore Klepser**, secretary, 84 Northledge Dr., Snyder, NY 14226

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Everything is going well for **Markus Zahn's** family. Markus was promoted to full professor in the Department of Electrical Engineering and Computer Science at MIT and will be on sabbatical for the 1992/93 academic year at Laboratoire D'Electrostatique et de Materiaux Dielectriques, Centre National de la Recherche Scientifique and at Joseph Fourier University in Grenoble, France. He, Linda, and 13-year-old Amy have all been studying French to prepare for their year in France. Daughter Laura recently graduated from Smith College, majoring in biology, and will work in a genetics laboratory at Harvard Medical School before continuing on to graduate school. Daniel is in his junior year in electrical engineering, and Jeffrey is in his sophomore year in chemical engineering, both at MIT. . . . **Carlyn Voss Iuzzolino** writes that she and her husband, **Harold** both work for Geo-Centers in Albuquerque as contractors for Sandia Labs. Harold works on the WIPP project, and Carlyn works on Inertial Confinement and Fusion. Their daughter Terri is a junior at MIT majoring in computer science.

I am sad to report that **Bill Day** died unexpectedly last May in his Somerville home. He was a motion picture engineer and co-designer of the guidance system for the Apollo moon lander. Fol-

lowing graduation, he went to work at the Draper Laboratory, which was under contract to NASA, and received a presidential medal for his work on the guidance system for the lunar excursion module, or LEM. He later established his own consulting and design business in Somerville, and for more than 20 years he focused on the practical application of scientific principles to the recording of sound for movies. His customers included local television stations, universities, and motion picture production companies.

Alan Gevins, who lives in San Francisco, has founded SAM Technology to develop devices to measure the neural networks of thinking in the human brain. These devices will be based on his basic research during the past 20 years.—**Charlotte and Jim Swanson**, co-secretaries, 878 Hoffman Terrace, Los Altos, CA 94024

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25th Reunion

This is still the first column since our return from Japan in May. We would like to thank Class President **Rick Lufkin** for filling in for us for six months. Mike left in November for a stay at the University of Tokyo, financed by an NSF grant, to study Japanese policy for new radio technologies. Gail came a month later on an exchange from the Nuclear Regulatory Commission to its Japanese counterpart, MITI. We had a nice but small apartment in the Gotanda area, which reminded us of our graduate-student days (although in Tokyo it would typically be occupied by a family with three children). We found it a very rewarding experience and would be glad to talk to others who may be considering a long-term visit to Japan. In many ways, it is where the action is!

The big news this month is that two of our classmates were elected to the MIT Corporation in June: **Shirley Jackson** and **Bob Metcalfe**. Our congratulations to both. . . . Bob reports that he is in touch with **Nick Covatta**, Nick's wife, Robin, and their two young daughters, who live on the Eastern shore of Virginia. He says that "Nick grows azaleas, rents fork lifts, sells truck parts, and advises computer companies in his growing industrial empire." Bob himself will be having a big year in '93, when he will celebrate the 25th Reunion of the Class of '68, and the 20th anniversary of his invention of Ethernet.

Shan Cretin writes that she left UCLA in 1990 to start her own business specializing in total quality management consulting to health-care



George Phillies

specializes in the dynamics of polymer diffusion.

From newspaper clippings we learned that **Robin McGuire** is president of the Seismological Society of America and that **Michael Oman** is working in Jericho, Vt., as a transportation and regional planning consultant. . . . We sadly report the death of **James Campbell** in 1991. Our condolences to his friends and family. At the time of his death he had been living in Bedford, Mass. We would like to print more details if anyone can provide them.—**Gail and Mike Marcus**, secretaries, 8026 Cypress Grove Lane, Cabin John, MD 20818

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David W. Bennett received a PhD in intercultural studies from Fuller Theological Seminary in September 1990. In 1992, he coordinated leadership training seminars in India and Nepal. Currently, he is senior pastor of the Mountain Park Church in Lake Oswego, Ore. . . . **Gary B. Carpenter** writes: "Met Steve Cooper, '70, while attending the International In-line Skating Association Championship. I finished 12 out of 15 in the 40-49 novice group." . . . We read that **Raymond Eng** ran for re-election in the Marlboro Township Board of Education in New Jersey and won.

Elizabeth Grundlehner Riordan, now of Prides Crossing, Mass., ran this year in MIT's annual track meet. Running the mile for the first time, she came in third in a field of eight men. Among the 205 newly-elected fellows of the American Academy of Arts and Sciences is our class cosmologist, **Marc Davis**, of the University of California at Berkeley. The Academy was founded in 1780 by John Adams and other leaders of the young American republic "to cultivate every art and science that may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people." Today there are 3,200 fellows, among them 155 Nobel laureates and 59 Pulitzer Prize winners.

Meanwhile, down in the microcosm, tiny deuterons are doing strange, unknown things with Pd atoms in the depths of my basement. As you read these notes in October, a meeting sponsored by seven Japanese scientific societies addresses cold fusion science at the Third Annual Conference in Nagoya. If all has gone well, I'm there to deliver a paper.—**Eugene F. Mallove**, secretary, 171 Woodhill-Hooksett Rd., Bow, NH 03304

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Michael Fuchs writes: "After a predictably checkered bunch of careers, I now find myself married, with an 8-year-old child, a dog, cat, properties, commutation ticket—the whole adult catastrophe. I am currently one of many VPs at Citibank in New York, managing a portion of the bank's technology. Next report in less than 20 years!" . . .

Peter Marmorek tells us that he is still teaching English at a high school in the Toronto area and loving it. He also coordinates the enhanced student program. He says, "older than I used to be, but probably younger than I will be."

Leonard Etlinger is the dean of Continuing Education at Chicago State University and a professor in the College of Education. He has a wife, Fannie, and two children, Tom, 10, and Megan, 7. . . .

Steve Young has three children—Lauren, 6, Chelsea, 4, and Jeffrey, almost 1. He also has founded Floreat Inc. in Saratoga, Calif. . . . **Harry Ting** left Hillhaven Corp. early this year to set up his own health-care consulting firm in the Seattle area, providing business planning, market research, and economic analysis.

Please keep writing to us or *Technology Review* with your news.—**Greg and Karen Arenson**, secretaries, 125 W. 76th St., Apt. 2A, New York, NY 10023

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Rudolfo Castro Alpizar is alive and well in Costa Rica. Lucy and I had a chance to visit him and his beautiful country recently. He sold his concrete business, but remains active in the hotel business and the fresh-cut flowers business. He exports flowers to Europe and the United States. One of his sons will be attending Georgia Tech in the fall. Rudy has also been active in politics. His grandfather was the first president of Costa Rica and he is following in those footsteps. He recently

negotiated a very tense labor situation on the coast. The mountains in Costa Rica resemble those in Switzerland except that a few are active volcanoes. There is excellent fishing off the coasts, lakes, and rivers, and the beaches are as beautiful as any in the world. The people love North Americans and the United States and are happy to see you. Everyone prides themselves on their literacy and cleanliness. If you have not been there, I encourage you to go.

Jonathan Lukoff, M.D., sends a picture from his safari to Kenya and Tanzania. He and his wife, Linda (who is expecting), went on a tour and met Bob ('72) and Esther Painkian. The picture is in Tanzania's Ngorongoro Crater. After their safari they climbed Mt. Kilimanjaro on the Machame Route. Jonathan reached the summit of 19,340 feet on both Gilman's and Uhuru Peaks. He also learned to scuba dive in Maui in December and is PADI-certified. Last year they visited Jaime Almos in San Diego.

Leonard Sherman joins J.D. Power and Associates as a partner in charge of the East Coast Office in the firm's new strategic consulting practice. Leonard's firm is an international marketing information and consulting firm. Leonard received a PhD in transportation economics from MIT along with his bachelor's and master's degrees. He was previously with Booz, Allen & Hamilton, Inc.

Marc Roddin continues with regional planning activities in San Francisco/Oakland/San Jose. His big effort last year was deciding how and where to expand Santa Clara County's new light rail transit system into the north county. This year he is working out ways to match demand with supply for his region's 25 airports.

Andrew H. Sims, Jr., has just completed his third year as executive director of the South Essex Sewerage District in Salem, Mass. He was also just made a diplomat of the American Academy of Environmental Engineers and is currently serving as editor-in-chief for two major books being written by the Water Environment Federation on Utility Safety Programs. . . . Please send me your news.—**R. Hal Moorman**, secretary, P.O. Box 1808, Brenham, TX 77834-1808

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As I write this I have just come back from our class's 20th Reunion. As the saying goes, "A good time was had by all"—thanks to the hard work of our reunion committee members. It was great to see everyone who made it there, and already thoughts are drifting ahead five years to our BIG reunion, the 25th Reunion. Our class activities started on Friday night with a party, where **Dick Fletcher** organized roller skating again. In the rest of his time Dick is "still designing jet engines" for GE. If pressed he will admit that he has been promoted, so now he needs to spend time managing the people too. Last year Dick had a great trip to Scandinavia with his niece who was studying in Germany. **Bonnie Miller** was the co-organizer of the Friday night party, taking charge of organizing Karaoke singing. She continues to work administering special education programs. The party was a lot of fun, and many members of the class rediscovered their roller skating abilities, or tried roller blading. We all discovered that some members of the class are great singers, and others were quite entertaining as they got up to do the

karaoke singing. **Vicki Haliburton** brought her daughter Grace to the roller-skating. Grace outskated most of us, although there were many enthusiastic skaters in the group.

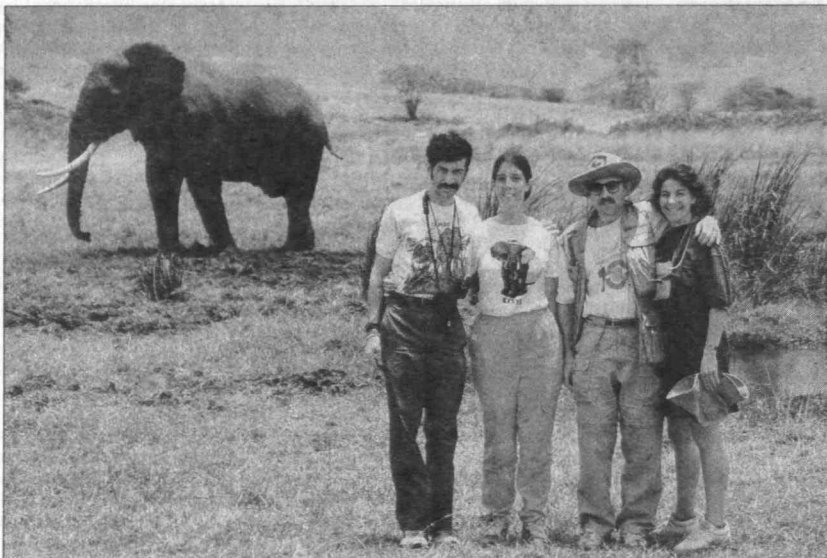
On Saturday Paul Tsongas gave an interesting keynote speech on K-12 education for the morning's panel discussion. Lunch was a great barbeque held indoors due to the threatening weather. In the afternoon the class competed hard in the alumni challenge games, but we lost to the class of

those who were interested. Doug went to law school years ago in my home state at the University of Michigan, and now is a corporate law partner in a Boston law firm. This summer he is going to a family wedding in France with his wife, Francine, and their four children, followed by hiking in the Swiss Alps. I have been promised a future report of how the hiking went, especially with their youngest who is a 1-year-old.

During the class business meeting **Bonnie**

Kellermann was re-elected president by acclamation. **Dick Fletcher** and I were re-elected class secretaries, so keep sending us your news! **Steve Henry** was re-elected treasurer/agent. **Dennis Lynch** has agreed to serve in the important role of co-chair for the 25th Reunion Gift, (more about that in a future column).

Bob Ebert also helped on the reunion planning. He continues to play the clarinet and other instruments. In fact he played with a group that won first prize nationally for the recreation of historical music. **Kathy Schwartz** had intended to attend the entire reunion, and ended up just putting in a cameo appearance at the brunch since she spent the rest of the weekend house hunting. She is moving back to the Boston area. **Sarah Simon** has left the EPA to do environmental consulting for Arthur D. Little. Her husband, Tom Doane, joined us



Ngorongoro Crater, Tanzania—From left: Elephant, Bob ('72) and Esther Painkian, and Jonathan ('71) and Linda Lukoff.

1967 which had the advantage of much greater numbers due to the traditionally large turn-out of the 25th reunion class. **Bonnie Kellermann** and **Paul Levy** had helped to organize the games. Our class did particularly well in volleyball and the College Bowl. Paul teaches part-time at the 'Tute and spends the rest of his time consulting, having left public office for the moment. Bonnie continues to work for the 'Tute, now in the Registrar's office. Also her precision skating team came in first at the National's this year, after having narrowly missed being first last year.

Victor Tom did a great job of organizing a delicious Chinese dinner at Joyce Chen's on Saturday night. The dinner was followed by a nostalgic night back at the dorm, where many of us out-of-towners stayed, organized by **Duncan Allen**. Duncan created a terrific crossword puzzle relating to when we were at the 'Tute. **Paul Hirschorn** came from California. He had taken terrific photos at the 15th Reunion which were on display. **Steve Chessin**, also from California, was recently re-elected secretary of the Santa Clara County Democratic Central Committee. He is interested in grassroots politics, and is actively working on the Barbara Boxer Senate campaign. We will all look forward to what he brings to the 25th. **Dennis Lynch**, **David Burns**, and **Michael Rowny** tried to remember who had been on the crew team, so they can get them to come back for the 25th Reunion. Dennis works for Federal Express in Memphis. His wife was unable to accompany him, since they had just returned from a trip to Argentina where she had taught a seminar, and where Dennis joined her for sightseeing. Michael in contrast brought his whole family. It was great to get to see Melissa again, and their kids enjoyed being in the Progeny Program. About a year ago Michael became the CFO of Washington, D.C., area based ICF International, Inc. They do harbor clean-ups and other environmental clean-up work.

Doug Zingale organized a great brunch at the Pierce Boathouse, which included the class business meeting, and then rowing on the Charles for

for dinner Saturday night. **Karl Strelau** was in from Saratoga, Calif. He is working part-time for Apple Computer while he continues with research related to a PhD thesis at Berkeley. **Charlie Smith** managed to show up with his original freshman picture book. It was interesting to note who had changed a lot and who had changed very little in the intervening time.

Julian Horn was recently married. He was at all of the events, and was one of the great singers in the class. On Saturday night he brought along his guitar which was greatly appreciated, as he led a number of us in singing. **Richard Weissburg** now has the perfect job for himself. He is doing international marketing for Lotus. **Roger Putnam** continues to be the director of the Center for Optical Sciences at Aerodyne Research, Inc. For the past 15 years **Richard Pini** and his wife, Wendy, have been publishing a comic book that comes out bi-monthly. In addition, about once a year they publish a book of the most recent issues. They have built up an impressive organization and circulation, but I forget the name of the book!

Conan Li took time off from working at Abbott Labs to fly in from Chicago for the reunion. **Ron Crane** came from California to be there. **Adnan Akant** and his wife, Alison, also came with their cute children. He has been in New York City for the last eight years trading U.S. treasury bonds. **Robert Sorrentino** and his wife, Margo, came from Tucson, Arizona, with their children. He is now working in hospital emergency services in Tucson, and doing computer advisory services. **Brian Good** and his wife, Anne Chaka, came from Cleveland, Ohio, where he continues to work as a research physicist for NASA.

Some of the other faces seen at the reunion included **Bob Goodof**, **Mark Gorenstein**, **Dean Solomon**, **Terry Marks**, **Gerald Zuckier**, **John Kryzwicki**, **John** and **Beth Sullivan**, **Paul Lentricchia** and **Turgay Ozkan**.

I am sorry to have to tell you that **Sandy Wiener** died last fall, after a long bout with cancer. I think we will all remember her best as we

look at our Brass Rats, since she was head of the ring committee. We shall miss her.

As to other news that people have sent in. **Ken Berniker** missed the reunion because it conflicted with his son's Bar Mitzvah. He continues to serve as assistant chief of the Emergency Department at Kaiser Hospital in Vallejo, Calif. **David Townzen** has been at Micrion Corp. since 1984, designing electronics for focused ion-beam systems. In 1989 he married Vanessa Barss, and they now have two wonderful daughters, Lara and Rachel. His hobbies include sailing and home brewing. **Doug Mahone** is living in Sacramento while working with a consulting firm doing utility demand-side management work. As director of Architectural Research for ADM Associates, Inc., he's an architect surrounded by engineers and economists just like at MIT. He's working with his wife, Lisa Hesdon, M. Arch '78. Despite the dire warnings of the hazards of working with a spouse they are enjoying it immensely. His kids Amber, 11, and Tyler, 8, are flourishing. His final note is one I agree with, to quote Douglas, "Come on you guys, send in more news!"

Lee Brown and his wife, Carol, have two sons Matthew, 9, and Douglas, 8. He is now an associate professor of medicine at Mt. Sinai School of Medicine in New York City where he runs the Sleep Laboratory and the Pulmonary Physiology Laboratory at Mt. Sinai. He also does internal care medicine, and is doing research in sleep apnea syndrome and in exercise physiology. **Thomas W. Eager** won two awards from the American Welding Society at its March Awards banquet: the Comfort A. Adams Lecture Award for his talk on "The Science of Welding and Joining Processes," and the Charles H. Jennings Memorial Award for the most valuable paper written by a college student or faculty representative published in *Welding Journal* last year. Tom is the director of the Materials Processing Center at MIT. He is the Richard P. Simmons Professor of Metallurgy and a Leaders for Manufacturing Professor of Materials Engineering.

William H. Ku had a new baby girl in January, and moved into a new house in Chesterfield, Md., in May. **Eugene Kroch** left the Penn Economics Department to spend a year at the New York Fed, which was great professionally, but he is glad to be back in Swarthmore with his family. It was a strain to spend the work week in NYC and see his family merely on the week-ends. "Well back to the university life! It's not so bad at that." **Joel Weisberg** has become a professor of physics and astronomy at Carleton College. **Thomas Walker** is now a senior VP at American Reinsurance Co. **Ray Magliozzi** co-hosts the popular hour-long public radio program "Car Talk" with his brother Tom, '58. They answer questions about car maintenance and repair, combined with anecdotes.

For those of you in attendance at the reunion, whose news I have not mentioned please look to Dick's column next month. (I had to leave him some news). For those whose news I got wrong, attribute it to the deteriorating memory which comes with age. For those who were not there, please don't be timid, your classmates are interested in what you have been doing in the past year or two or 20: send us your news and we will print it for all to see. As I write this shortly after the reunion, I am about to head off to France for many months. I hope you all have had a fine summer, and send us your news.—**Wendy Elaine Erb**, co-secretary, 6001 Pelican Bay Blvd., Apt. 1003, Naples, FL 33963; or **Dick Fletcher**, co-secretary, 135 West St., Braintree, MA 02184

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I received a lengthy letter from **Ed Weinberger** not too long ago. Ed has gone beyond his window-cleaning route of some years ago. He joined American Science and Engineering back in 1974, moving on to a stint at Draper Labs on the space-shuttle program ("I was on the flight control sys-

tem," he says, "so it wasn't my fault, guys!") Ed moved on to graduate school in math at the Courant Institute in New York, where Puzzle Corner editor Allen Gottlieb teaches. Ed actually advertised in the *Village Voice* personals for a "female who doesn't know calculus" and later met his future wife Lynette, who was looking for someone who *did* know calculus. His thesis was on a mathematical proof of the possibility of evolution, which led to post-doc research in Germany on the subject. He is now juggling research, consulting, and job hunting, wondering aloud if, perhaps, he "should have stuck to window washing."

Jim Weihe says "aloha" to all. He has "moved to Paradise," working as a psychiatrist for the VA. ... **Tom Ellis** announces the birth of Kevin Alexander last November. The arrival obliged the Ellises to find a new house, so their last few months have been hectic.

James Colville is practicing sports medicine in San Jose. He just returned from two weeks in Europe as team physician for the U.S. water polo team touring prior to the Barcelona Olympics. ... **Peter Vicellio** supervised a mock multiple-car accident staged to teach medical students at SUNY Stony Brook the role of emergency medical technicians at disaster scenes. ... We are saddened to have just learned that **Paul Balian** passed away in April 1990. Our long-belated sympathy to his wife, Eileen, and family.

The first child of a member of our class to graduate high school was my son Eric, who recently left Fauquier High behind him and is on his way to college. By the time you read this he will have begun the experience we shared together. *Sic transit gloria mundi*. ... Write!—**Robert M.O. Sutton, Sr.**, secretary, "Chapel Hill," 1302 Churchill Ct., Marshall, VA 22115

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To those of use who are passing the Big 4-0 this year, remember, we're not 40, we're 30-10. ... While prowling the byways and alleyways of Boston's Route 128 ("America's Technology Region") searching for another victim to inflict my computer consulting expertise upon, I came across **Harvey Michaels** at Xerogen. Harvey was mentioned not long ago in this column, but I think I'll do it again in case he needs to hire me back. Xerogen is a very hot company in an even hotter field—energy conservation—and Harvey is VP of Operations. Nice view out his office window, too.

Jeff Mayne pens that he and his wife are in the biology department at Vassar. Son Ben should be well into his "terrible twos" by now. They will probably be leaving the Poughkeepsie, N.Y., area this summer, moving to Wherever-The-Job-Is, USA. ... There was a nice write-up about **William Chatkowski** in the *New Britain (Conn.) Herald* last February. (Sorry, news does take a long time to get to Class Notes Central.) William is VP of Engineering for Keyfile Corp. of Nashua, N.H., and their product, Keyfile, does electronic document handling on standard PCs.

Class Notes Central received a nice letter from **George Harper**, who recently received a PhD in church history from Boston University. His dissertation is entitled "Changing Patterns of Pastoral Ministry in Mid-Eighteenth-Century Boston." George has been active in the usual pursuits of recently graduated PhD's: teaching, producing papers (for the American Society of Church History), and most of all looking for a job. George lives in Ipswich, Mass., if anybody out there needs a good church historian. ... Two recent issues of the *AMITA News* crossed our desk with notes about classmates. **Abbe Sue Rubin** is manager of Biometrics at Immunex Corp. in Seattle. ... **Elizabeth (Bagnall) Scarito** is planning a summer graduation from the University of Maryland Medical School and will do her residency in internal medicine.

The MIT Center for International Studies has announced that **Seth Racusen** of the Department of Political Science has been selected as a MacArthur Scholar for the summer of 1992 and the 1992-93 academic year. ... **Larry Bowman** jests that "in the last nine months I've moved from Chase to GE to Citicorp. I really like working for small entrepreneurial companies." ... "Enjoying fast-paced submarine life as well as periodic idylls of Polynesian paradise," writes **Manuel Malagon-Fajar**. Manuel is working out of Pearl Harbor in the U.S. Pacific Submarine Fleet Tactical Readiness examination team. ... **Amos Oshrin** is working in the New Technologies Group at Progressive Insurance in the Cleveland suburbs with classmate (and longtime friend) **Barry Zack**.

Brenda Chinn Kurnik has been promoted to associate professor of Medicine at the Robert Wood Johnson Medical School in Camden, N.J. She has also been serving as president of the New Jersey Society of Nephrology. So says her husband, Peter. ... **Alan Horowitz** is living in Silver Spring, Md., with wife Sharon and their three boys, Daniel, Eric, and Joel. After 11 years with the Solicitor General's Office of the Department of Justice, Alan is now in private practice at Miller & Chevalier in Washington, D.C., specializing in Supreme Court and Appellate practice. "I still play basketball occasionally, but it is not noticeably slowing my descent into middle age."

Fujio Hayashi now lives in Binghamton, N.Y., working as a manager of Business Development for the Imaging Products Division of International Paper. He and wife were expecting their third child in May. ... Ann and **R. Gregory Turner** of Katy, Tex., announce the birth of Robert James in March. "Bobby" joins Matthew, Alan, and Patty in the Turner household. R.G. Turner Architects celebrates its eighth year this summer. The business has grown steadily at about 30 percent each year, and earlier this year they won an award from the Illuminating Engineering Society of North America. Gregory has also been active on the MIT National Alumni Fund board.

Pamela Jackson Bush received the prestigious Dean's Award as the Black Engineer of the Year Awards this spring. The award, presented in Baltimore, lauds Pamela's career at AT&T, her dedicated service to the Bell System Women and Minorities in Engineering Program, and her volunteer efforts teaching chemistry on Saturdays to pre-college minority and female students. ... Anybody want to be class secretary?—**Lionel Goulet**, secretary, 115 Albemarle Rd., Waltham, MA 02154-8133, (617) 899-9694

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Here's the news: **Allen C. Hart** returned to Grumman in August 1991 after a two-year assignment at Software Valley Corporation in West Virginia. Before Allen left Software Valley, Senator Robert C. Byrd presented him with a certificate of appreciation at their annual conference. In November 1991, Allen was elected to the board of directors of Software Valley Corp. ... **Paul J. Sanchez** writes, "Enjoying life with wife, Susan, Richard (4) and Kristen (1). Fortunately for them, the kids take after their mother." ... As of May 1992, **Beverly Ross Jamison** had completed her third successful year on the faculty of the University of Hartford, Department of Mathematics, Physics, and Computer Science. She and Navy husband, Richard Jamison ('76), and daughter Ruth will move to Washington, D.C., where she will start a new job as an assistant professor of computer science at Marymount University of Arlington, Va.

Notable in my life is Pennie & Edmonds' opening of a Menlo Park, Calif., office this past spring. I will be spending time in our California office on a regular, rotational basis and would love to see classmates in the San Francisco area, whether or not you have patent problems. So look us up—

we are in the book. That's it for now. Keep writing.—**Jennifer Gordon**, secretary, c/o Pennie & Edmonds, 1155 Avenue of the Americas, New York, NY 10036; or 18 Montgomery Place, Brooklyn, NY 11215

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From **Marvin Bugg**: "Just had my 10-year anniversary at Monsanto. Trish, Bryan, and Emily are doing great. Besides the Cardinals winning the pennant, I'm sure the Monsanto 'Slob Dogs' will do just as well as 'Slow Death' did at MIT." . . . **Dianne Glennon Khuzami** has "relocated with Citicorp Real Estate from Miami to New York on January 1, 1991, and married January 11, 1991." . . . **Phuong Trinh** has "been busy in private practice in Montgomery County, Md., in infectious diseases. We are presently a three-person practice and are expanding to include a fourth associate in July 1992."

We have finally heard from **David Littleboy** after more years than your secretary cares to contemplate. David and his wife live in Japan, where he owns a translation company. In addition to providing translation services, he also publishes *The Expatriate Ledger*, a political economics chronicle of Japan's economy and the changes occurring in it now. Your secretary recommends highly David's publication, especially if one follows and trades the Nikkei futures.

As for your secretary, in spite of strenuous efforts to leave the Wall Street brokerage community for the world of high tech, I am running a trading desk as a consultant for the summer. It is a long story as to why, but I am still pursuing my various high tech projects as well. The difference is that I sleep less, and work more. Since I can not work harder, I naturally continue to try to work smarter. So in spite of my move temporarily back into brokerage and trading, I still am working hard to get out, and stay out. It may look glamorous from the outside, but the brokerage business, and especially futures, is no a pleasant one. And it can be very risky.—**Arthur J. Carp**, secretary, Quantalytics, Inc., 220 Henley Rd., Woodmere, NY 11598-2523, (516) 295-3632, Fax: (516) 295-3230

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Please send news for this column to: **Ninamarie Maragioglio**, secretary, 8459 Yellow Leaf Ct., Springfield, VA 22153-2522

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15th Reunion

It is my sad duty to report the death of **John Ernest**, who passed away in April. John graduated in mechanical engineering and was a member of Alpha Tau Omega fraternity. He was an engineer at Digital Equipment at the time of his death. John is survived by his parents, a brother, and a sister.

On a happier note, **Carolyn Meyers Conrad** and husband, Dave, announced a new arrival, **Julianne Emelia Conrad**, born on May 27, 1992. **Julianne** joins siblings **Jacquelyn** (5) and **Jeffrey** (3). The Conrads live in Kingsville, Md. . . . **Bill Lasser** writes, "My wife, Sue, and I are the happy parents of **Max Hoffman Lasser**, born July 18, 1991. I am currently teaching political science at Clemson University in South Carolina." **Bill** and family live in Taylors, S.C. . . . Congratulations go to **Beth Plasse Dominguez** who was recently married.

Steve Piet, still opinionated after all these years, tells us what he's doing now: "My wife, Robin, kids **Valerie** (4) and **Alex** (3), and I continue to like living in Idaho Falls, Idaho. I'm still with the Fusion Safety Program at the Idaho National Engineering Laboratory, even with the continuing best

efforts of the DOE to replace productive engineers and scientists with bureaucrats, auditors, and lawyers. The world fusion research community is awaiting the start of the next phase of the International Thermonuclear Experimental Reactor effort involving the United States, European community, Japan, and Russia. We'll have some role in that project, depending on the level of safety consciousness of the new international management. (Your class secretary hopes that safety consciousness is the top priority with this effort, unlike past DOE efforts!)

Bill Leland brings us up to date: "In 1988, I finished a PhD at UCLA in electrical engineering, then set out on a short adventure driving from Los Angeles to Minneapolis in a 1971 Datsun. After only two weeks in Minneapolis, I ran into a friend from L.A. named **Sue Ann**. A year and a half later, we were married in Minneapolis in minus 20 degree weather, three days of snow, and a closed airport. We are enjoying married life in Alabama and **Sue Ann** is a student in environmental engineering."

Lillian Lin also brings us up to date: "I got a PhD in biostatistics from the University of Washington in December 1990. January 1991 found me as an assistant professor of biostatistics at the newly-formed Emory School of Public Health in Atlanta. Besides teaching PhD-level courses, I am working on clinical trials in HIV prevention and bone-marrow transplants." . . . **Fern Crandall DuVale** was awarded the **Joe Wenick** outstanding alumnus award for all of her work for MIT in northern New Jersey. She has held numerous vice-presidential positions in the area MIT club, and helped out with a telethon last year. **Fern** has also been an educational counselor for five years. Congratulations to **Fern** for a well-deserved award!

Alan Knauf writes, "I married **Patricia Parks**, a graduate of Georgia Institute of Technology ('Tech') on August 31, 1991. I practice environmental law in my own firm in Rochester, N.Y., and am also VP of a new company, **American Recycling and Manufacturing**, which does 'closed loop' recyclable or reusable packaging. **Patti** is a marketing specialist at **Kodak**."

Paul Edelman also sends his news: "My wife, **Julia**, and I are pleased to report that our son **Eric** just had his first birthday. Older brother **Abe** is 3. My consulting business is going well. I just signed a contract to assist a manufacturing firm in developing self-managing work teams." . . . **Gene Allen** is presently the director of collaborative development for the National Center for Manufacturing Sciences, establishing collaborative R&D programs among manufacturing firms and, when practical, governmental agencies and labs. . . . **John Jaynes** sends us another amusing note from Bedford, Tex.: "After seven years with **American Airlines**, I still haven't figured out the industry. Given our rates of return, I think my experience could be easily transferred to non-profit work. The fall will find us with one daughter in third grade and the other starting kindergarten."

Don Mellen says he is still working at **Bell Labs** in New Jersey, currently on the development of a CAD system for printed circuit board design. **Don** lives in Warren, N.J. . . . **Heather Hazard** sends us her news from the continent: "I accepted a tenured position at the Institute of International Economics and Management of the Copenhagen Business School. We moved here last August so our two Danish-American children **Alexandra** (3) and **Henrik** (1) could grow up close to their extended family and roots. **Alexandra** already speaks better Danish than I do; fortunately for my students, I teach in English." . . . **Rich MacKinnon**

"returned to work for **PCL Construction** to Denver, Colo., as project manager on the terminal building at the new **Denver International Airport**. I returned to Denver from **Raleigh, N.C.**, with my wife and three children including our newest arrival, **John**, born in August 1991. Since graduating, I have spent a lot of time in Colorado's mountains, skiing and climbing all 54 of Colorado's 14ers (peaks over 14,000 feet)."

Send in your pithy sound bites (write bites?) about your career, your family, your hobby, or your volunteer activities!—**Jim Bidigare**, secretary, 9095 North Street Rd. NW, Newark, OH 43055-9538, (614) 345-8582

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Karl Nyberg and his wife, **Lori**, had a son, **Ethan**, last December 30. The Nybergs live in Vienna, Virginia. . . . **Deborah** and **Steven Feldman** gave son **Andrew** a little sister, **Sharon Michelle**, on April 22. The Feldmans live in Framingham, Mass. . . . **Rick Kovalick** and his wife, **Susan Mozzicato**, returned from an enjoyable vacation in Bermuda and are just about to break ground on an addition to their Newton, Mass., house. A garage, family room, and screened porch are planned. **Rick** writes, "Everyone tells us that building an addition is even worse than building a house from scratch. Hopefully, our cats, **Fudge Ripple** and **Peach Melba**, don't get too freaked out by the whole process."

Spy of the Month award goes to **Pete Steinhagen**. He wrote me a l-o-o-o-n-g letter en route back home from the testimonial dinner for MIT Baseball Coach **Fran O'Brien** in May. He reports, "The tribute was planned officially by 'The Friends of MIT Baseball,' a group organized loosely by Coach O'Brien to provide support for the baseball program. This spring, several alums decided to make a strong effort at financial support, establishing the '400 Hitters Club' to help with dugouts and other field improvements. These alums—**Joe Kracunas**, **Carl Nowiszewski**, '81; **Rich Charpe**, '74; with help from **Al Fordiani**, '81; and **Steve Kousowsky**, '86—also felt it was a good time to honor Coach O'Brien for all he has done for baseball at MIT and for the players he has influenced along the way. The effort culminated in a dinner at the Hyatt on May 2, which included 30 baseball alums and their families." Among them: **Kevin Holland**, who is considering an MIT PhD in toxicology after taking time off from **DuPont**; **Steve Garverick**, who is going back to Ohio to take a professorship at **Case Western** and is the father of two children; **Tom Griffin**, '80; **Tim Garverick**, '80; **Even Shapiro**, '80; **Phil Bugnacki**, '78; **Roy Henriksson**, '76; **Vin Maconi**, '76; **Mike Dzeikan**, '76; **Rick Van Effen**, '78; and **Mike Royal**, '76. Co-organizer **Joe Kracunas** is still with **GE** in **Lynn, Mass.** He and wife **Debbie** live in **Groveland, Mass.**, and have a three-year old daughter, **Allison**, and a newborn son, **Stephen**. **Al O'Connor** joined some of the group at **Fenway** the next day (to see the Sox lose to **Kansas City**). **Al** is between jobs after a winter of honing his skiing skills out West. **Al** reports that **Keith Giamporstone** was married last fall and lives near **New York City**. **Al** has seen quite a few class members lately, including **Tom Lenk**, **Phil McNeil**, **Hoyt Davidson**, **Dave Tohir**, and **Bruce Wrobel**. . . . As for **Pete Steinhagen** himself, he is still living in **Alexandria, Minn.**, and making sandpaper for **3M**. He and wife **Janet** are the parents of 7-year old **Chet** and 5-year old **Maria**. **Pete** collects and repairs antique radios, and asks, "Does anyone have one in the attic?" Thanks, **Pete**, for all the great dirt.

News from MDs all over: **Michael Fasullo** has joined the faculty of **Loyola University Medical School** last September. He was married to **Cinzia Cera** in **Padua, Italy**, on July 27, 1991. They reside in **Oak Park, Ill.** . . . **Richard Meinig** is on the clinical faculty of the **University of Colorado Health Sciences Center** in the **Department of Orthopedics**. He is also a principal investigator in polymer membranes of bone regeneration at the **Laboratory for Experimental Surgery** in **Davos, Switzerland**. (Apparently he has managed to solve the age-old dilemma of being in two places at one time). . . . **Roger McSharry** is finishing his training in pulmonary medicine and critical care at **Stanford University Medical Center**. He is awaiting assignment to a **U.S. Navy Hospital**, "hopefully in

the Western Hemisphere." . . . **Marla Eglowstein** has relocated to Albany, N.Y., and is on the staff at Albany Medical Center as a perinatologist. Her husband, Eliot Rich, is "job-hunting and teaching our 3-year-old son Nathan how to use a computer."

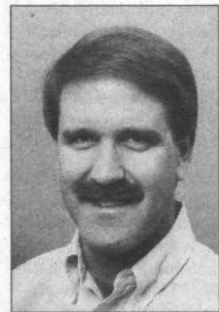
Gail Kaiser was granted tenure in the Computer Science Department of Columbia University in April. . . . **Michael Good** married JoAnn Close, '82, in September of last year. . . . **Andreas Kuehnle** is working for Daimler-Benz in Germany on an autonomous vehicle project. . . . **William Kincaid** is working on development tools and system software at Apple Computer. He has two children, Michael (5) and Graciela (2). He writes: "Reliving old days at MIT vicariously through my brother Duncan Kincaid, who is completing his first year there in architecture school."

Brian Wibecan is still working at DEC in VMS Engineering. He also conducts a small chorus at lunchtime, the Spit Brook Singers (a.k.a. Spit Tunes). He and wife Nancy have a 4-year-old daughter, Leah, and by the time you read this will have a newborn as well. "Enjoying life in Acton, Mass., where we've traded in the lawn edger for a snow blower." . . . **Steven Bauer** writes, "1991 was a very good year. Along with resuming bachelorhood, I was recruited to become the partner-in-charge of a new electrical engineering/computer science intellectual property group at Testa, Hurwitz & Thibault, a 130-attorney law firm in Boston, which has (depending on the accounting method) the first or second largest venture capital practice in the world. I also earned my 'wings' and can now fly with Baka (my Siberian husky) and Tucker (my 4-month old golden retriever) anywhere in New England on a moment's notice."

Kelly Gamble Hartshorn writes from Santa Cruz, Bolivia: "I'm enjoying a joint foreign exploration assignment for Chevron with my husband Peter. I went to high school in La Paz, the capital, over 20 years ago. I never thought I'd be back! Heard yesterday of a senior at the American School who just received his acceptance letter to MIT—he's as excited as I was, and I'm looking forward to talking to him about the Institute and Baker House!" . . . As for your class secretary, our departmental reorganization is still going on, and I have just been named to a newly-created Planning Department which is supposed to link I.S. development more closely with the business needs of our users (the new buzzword is "customers"). Since it's a new group, we don't quite know what to expect, but we do plan to have a lot of fun!—**Sharon Lowenheim**, secretary, 98-30 67 Ave., Apt. 6E, Forest Hills, NY 11374

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John Grunsfeld, senior research fellow in physics at the California Institute of Technology, has been selected by NASA as one of 19 new astronaut candidates for the Space Shuttle program. John was chosen from 2,054 qualified applicants. He'll begin a year of training and evaluation in August at the Johnson Space Center in Houston.



John Grunsfeld

One of our classmates who has been faithful in keeping us informed of his activities is **Steve Semken**. In June 1991, Steve married Carolyn Goldtooth in a traditional Navajo wedding ceremony. **Jim Leary** and **Kim Elcess**, '83, attended despite the remote location. In December 1991, with support from the U.S. Department of Energy, Steve opened the Navajo Dryland Environments Laboratory at the Navajo Community College. The facility supports

research in environmental geology of the arid southwest and is the first of its kind at a Native American college. . . . **Richard Chin** is "still slugging away at HP in the San Francisco Bay area."

Kate Mulrone, our class president, sends news of two students being helped by the Class of 1980 scholarship fund: Cheryl Ann Boyer, a junior from Pennsylvania is studying biochemical engineering and active in ice hockey, the Society of Women Engineers, and several committees. Robert Polansky from New Jersey graduated in June in Course VI-3. A member of Phi Kappa Sigma, he played intramural soccer, football, basketball, hockey, volleyball, softball, and ultimate frisbee!

I also have news to report this month. In May, I started working full-time as an actuarial student at Alexander Hamilton Life Insurance Co. in Farmington Hills. I love my job but the 30-mile commute (each way) will definitely speed up my husband's and my efforts to find a house in between our jobs. Send your news to: **Kim Zaugg**, secretary, 2384 Leslie Circle, Ann Arbor, MI 48105, (313) 665-2365, vayda@erim.org.

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Good news abounds this month:

And the winner is . . . Two of our classmates have been recognized by their peers for outstanding accomplishments. The Optical Society of America has awarded its 1992 Adolph Lomb Medal for noteworthy contributions to optics before reaching the age of 30 to **Mohammed N. Islam**. Mohammed was cited for his pioneering contributions to nonlinear optical phenomena and all-optical switching in optical fibers. He was hailed in particular as "a clear world leader in the field" of all-optical switching in fibers, as demonstrated, for example, in his work on "soliton dragging" all-optical switching, which has been characterized as "the first all-optical switch that has all of the necessary attributes of a digital logic gate." Mohammed is presently a member of the technical staff in the Photonics Switching Research Department at AT&T Bell Laboratories in Holmdel, N.J., and is also a consultant on optical fibers and short pulse generation for Lawrence Livermore National Laboratory. . . . Kudos to **Avraham Benatar**, the 1992 Adams Memorial Membership Award winner from the American Welding Society. Avraham has been cited for his outstanding teaching activities as an assistant professor of welding engineering at The Ohio State University, where he specializes in the joining of plastics and composites, welding design, and manufacturing and production engineering. The AWS notes that Avraham is "one of the world's two leading experts in ultrasonic assembly."

Proliferating Professors: **Steve Fetter** lets us know that he has been awarded tenure by the University of Maryland as an associate professor in the School of Public Affairs. Steve has also been awarded an International Affairs Fellowship by the Council on Foreign Relations, which he will use to spend a year working on nuclear proliferation issues in the State Department. . . . **Edward R. King** informs us that in August 1991 he joined the faculty of the University of Colorado at Boulder as an assistant professor of physics.

Short notes: For **Robin Raine**, 1991-92 has been great so far. Robin is now an engineer II at PGQ&D and has recently gotten married. . . . **Stephen Probst** joined Charles River Associates last November as a senior associate in its automotive and transportation management consulting practices. . . . **John Macialewski** completed an MBA program with a concentration in accounting at the University of Connecticut last December, and took the Uniform CPA exam this past May. John is employed by the U.S. Postal Service.

Moving story: While we're on the subject of the U.S. Postal Service, everyone likes to complain about the mail, but I'll at least give them credit for forwarding my mail to me from my old address, even if some of it gets to me long after it's origi-

nally sent. **Richard Scheuermann** sent me a long letter last December (!) reporting his activities. Over the last five years, until this past January, Richard and his wife Nancy were living in Switzerland, where Richard was doing immunology research at the Institute for Immunology in Basel. During their stay in Switzerland, Richard and Nancy really took advantage of that minimum four weeks' vacation (!) per year to travel throughout Europe, most recently to Hungary and Czechoslovakia. They also managed to find time to have a son, Alex, who turned 2 last October. But as of the first of the year, Richard and family have moved to Dallas, Texas, where he is an assistant professor in the Department of Pathology at the Southwestern Medical Center, University of Texas. Richard is glad to get back in the university system, which will be a lot of hard work, but hey, he made it through inorganic chemistry at the Institute, so he can handle this too. He also notes that "while there are a lot of things that I will miss about living in Europe, I haven't had a good burrito in ages."

Speaking of Texas, by the time you read my next column, there's a two out of three chance that a Texan will be headed for the White House. It should be a pretty exciting fall election season. Let us know about your own exciting activities.—**Mike Gerardi**, secretary, 1515 S. Flagler Dr., #1204, West Palm Beach, FL 33401, (407) 655-5050 (w); (407) 835-9013 (h)

82

By the time you read this, the class reunion will be a distant memory. It was a great success. One of the comments I heard most often was how great it was to be around MIT people again and hear about the interesting things that everybody is up to. I was impressed by how many people in the class had gone on to receive advanced degrees. At least half of the people I spoke to had. I know the survey results had the exact figure but I can't remember what it was. The only thing I remember from the survey is that 5 percent of us have had extramarital affairs. How's that for selective memory?

Class officers were selected for the next five years. They are: president, **John P. Kinney III**; vice-president, **Lucinda Linde**; treasurer, **Lina V. Janavicius**; and secretary, **Helen Fanucci**.

There's tons of news. Most people who were at the brunch left me a note about what they are up to. **Bob Wallace** is living in a renovated 18th century canal house (the canal was filled in 100 years ago) in Amsterdam. He started Apache BV to develop and market new relational database products for Windows. His first product, the Carlton system, looks like it has a good future. He reports that he is still single and misses the United States.

. . . **Linda Sigman** lives in Wilmington, Del., and is an architect for Moeckel Carbonell Associates. . . . **Richard Soley** is VP and Technical Director for Object Management Group located in Framingham, Mass. . . . **Darryl Zurn** does electronic publishing for a medical device manufacturer, Pharmacia Deltec. He's been a black belt in Tae Kwon Do for two years and has been teaching about 40 students for the last year at Minnesota Tae Kwon Do Center. . . . **Gretchen Young** is a senior engineer at Haley-Aldrich. She's married to Andrew Whittle, a professor in civil engineering at MIT. They live in Boxborough, Mass.

Cindy Hale Nicholson is still designing tanks at General Dynamics. Her daughter Melena is 14 months old and was a dancing sensation at characters on Saturday night at the reunion. Her husband, Kip, also works at General Dynamics. They live in Shelby, Mich. . . . **Ruby Chandy** graduated from Sloan in 1989 and now works as a consultant at McKinsey & Co. in Boston. She's married to John Adam, '82, who is an associate director of clinical research at Biogen in Kendall Sq. After graduating from MIT, John went to med school at Northwestern and did an internal medicine resi-

dency at Brigham & Women's Hospital in Boston. He had a fellowship at Dana Farber Cancer Institute. The couple live in Brookline. . . . **Sandra Waal** is a systems consultant and is married to John Gamma, a software/systems engineer at Antrim Corp. They have a daughter, Kitty, and reside in Allen, Tex.

Linda Sigman (nee Schaffir) and husband, Michael Sigman, ended their long distance romance (Connecticut to Delaware) when they were married last October. They are happily ensconced north of Wilmington. She works as an architect for Moeckel Carbonell Associates, the largest architectural firm in Delaware! . . . **Lynn Schnapp** is living in San Francisco and writes that she will be appointed assistant professor in pulmonary and critical medicine at UC/San Francisco after finishing her fellowship. She is still playing the flute and looking for a new band to play with. Also from northern California is **Cedric Dettmar** who resides in Palo Alto, and is (working too hard) managing software development for Oracle since getting an MBA from UCLA three years ago.

Johnathan Cohen is very happily remarried and living in Rockland County, N.Y. He's a real life practicing scientist and pharmaceutical process engineer working for American Cyanamid. No kids, no dog yet, but a great life. . . . **Alan Oppenheimer** is still working at Apple computer in Cupertino where he has been for the past nine years. (Probably one of the few classmates to hold down a job for that long.) He and his wife, Priscilla, have a house in Cupertino but escape to Oregon whenever they can. . . . **Lina Janavicius** is living in a fixer-upper in Somerville, which she writes looks like a farmhouse transplanted from Vermont. She's consulting for a start-up which makes ceramic membrane filters in Waltham. She's been engaged to Lou Morales for over two years and say's there's no wedding date yet. Her latest hobby is coaching a girl's soccer team when she is not doing home repairs.

Janet Jozwiak works for IBM in microelectronic packaging reliability. She lives in Wappingers Falls, N.Y., and has been married to Greg Martin for almost five years. She is managing to complete a master's in material engineering along with devoting lots of time to her house and dog. . . . **Josephine Lee** is known as Professor Lee at Smith's English Department. She is married to Kevin Kinneavy, a Colorado native. They live in a log home in Conway, Mass. . . . **Kathy Yelick** who finished a PhD at MIT in December 1990 is now at Berkeley. Fellow classmates who were at the reunion plead, "Kathy, write to us soon!" Kathy, write to me and I'll make sure your news is published for all to read.

Michael Rabinovitz is living in Bethesda, Md., and looking for a job as an electrical engineer. Hedging his bets, he is also applying for entrance to the PhD program in electrophysics at the University of Maryland. In the last 10 years, he spent four years as a naval officer (mostly as an engineer) at the Naval Surface Warfare Center in Silver Spring, Md. After that, he spent a year at IBM Federal Systems Division working on a proposal for a navy contract. He then went to the University of Maryland and graduated in December 1990 with a master's in electrical engineering concentrating in microwave systems. . . . **Chris Braun** is still a captain in the army, working at an electronics development job in New Jersey. This fall he'll be moving west to take a job as an assistant professor in the Engineering Department at the Colorado School of Mines. Chris also sends news from other classmates. **Matt Weinberg**, '82/'83, is living in Washington, D.C., working for the Office of Technology Assessment. . . . **Dave Furano** is living in San Diego, working for Martin Marietta and recently had a baby girl. . . . **Mike Post** is married, living in Pennsylvania, and has a new kid.

Galen Seitz lives in Portland, Ore., working for Tektronix on X-terminal products. He invites anyone who's interested in skiing to join him at Mt. Hood or Mt. Bachelor. Also he is willing to com-

pile an electronic mailing list of classmates. Send your e-mail ID to galens@orca.wv.tek.com. . . . **Erin Hester** is living in Charlestown, Mass., and working for the city of Boston, Public Facilities Department, as a project manager for renovation and construction of city-owned facilities. . . . **Margaret Sano** lives in Westerly, R.I., and is working for Ocean Surveys Inc in Old Saybrook, Conn. . . . **Roslyn Romanowski** works as a research hematologist at New England Deaconess Hospital and lives in Charlestown.

Thomas James lives in Philadelphia, Pa., working as an electrical engineer for GE Aerospace in Moorestown, N.J. He says it's tough being in the defense industry but great leaving the state you work in at the end of each day. . . . **Mike Colucci** and "Chickie" Colucci, '84, live in Saginaw, Mich. Their second son, Anthony Louis, was born in December 1991 and he thinks older brother Joey (2) is wonderful. Mike is working in consumer products research at Dow and Chickie is looking for a job teaching math in junior or senior high school. . . . **Mitchell Tasman** is working on a PhD in computer science at the University of Wisconsin in Madison. He's been there five years and expects to finish next summer. He works as a research assistant and teaching assistant and occasionally does consulting for BBN in Cambridge, Mass. He invites anyone passing through to give him a call. . . . **Nancy Huelsmann** is living in Pacific Beach, north of San Diego, working for Hewlett Packard in the color printer division as a materials engineer procuring PCAs. She is single and active in the Society of Women Engineers.

JoAnn Close married Michael Good, '79, last September. She is working at Analog Devices as an integrated circuit designer. She has been working there for almost 10 years! They bought a house in Arlington, Mass., and she is also studying flute at Langy School of Music. . . . How about honeymooning at an MIT reunion? That's exactly what **Jason Kaldis** and Laile Gianetto did. They were married on May 30th in Oakland, Calif. Jason works at Jarvis Architects, a residential design firm in Berkeley. Laile is an architect with PSM Architects, a commercial architecture firm in Walnut Creek. Jason finally completed his thesis in May '91 had earned a master of architecture design degree from UC/Berkeley. Jason is also on the board of directors of the AIA East Bay Chapter and continues to volunteer each at a local high school and play softball and volleyball while enjoying life in California.

Rick Cohen is working for Young Chang Research & Development (formerly Kurzweil Music Systems) designing synthesizers. . . . **Mindy Garber** is working for BBN managing customer services and studying Japanese. She owns a house in Arlington and invites other alums to visit. . . . **Eve Ahlers** and **Bill Numan** have a son, Tommy, born in April 1991. Bill is almost finished with a PhD in plasma physics at UCLA. Eve started a new job in GaAs integrated circuit processing R&D at TRW in June. . . . I understand that **Mark Walker** missed the reunion because his wife was expecting twins in mid-June.

Michelle Gabriel sent in the following news: "I must start off with an apology to **Joseph Shipman** for a previous column's reference to a 'cryptic message.' I did not receive the full text of Joe's letter and thus only reported that short piece. He has corrected my error and sent in the following news: 'Lisa Nanney, '84, and I have been happily married for 10 years and have two children, Benjamin (3) and Petra (1). My Brandeis PhD thesis appeared in the 10/90 *Transactions of the American Mathematical Society*. Until last fall I was a mathematical consultant and among other things, I gave seminars on Numeracy for the *Boston Globe*. Currently, I am in bond research at S.C. Bernstein & Co. in midtown Manhattan where Jonathan Reiss, '79, is the head of the department. Please say hello to **Jack Florey** from me.'" Michelle's new address is 1370 McKendrie St., San Jose, CA 95126.

As for me, I've been married to George Fanucci for over two years and had a baby girl, Amara, in November 1991. I resigned from Metaphor Com-

puter Systems to be a full-time mom, working harder than ever I might add. Keep those cards and letters coming.—**Helen Fray Fanucci**, secretary, 502 Valley Forge Way, Campbell, CA 95008, internet 74005.744@compuserve.com

83 10th Reunion

On June 25, I attended the 1992 New England Entrepreneur of the Year Awards Banquet. I was hastily snarfing down a tasty plate of filet mignon when I noticed that **Matthew Haggarty** was listed in the program as a finalist (Matt was also a finalist in 1991). The awards are given to entrepreneurs in the New England area in appreciation of their efforts and courage. It is a real tribute that Matt and his company, Product Genesis, were named finalists two years in a row.

I was pleased to have the opportunity to attend our class' first Bungee Jump Bachelor Party on Memorial Day weekend in Arcata, Calif. The occasion was **Chris Schneider's** wedding to long-time girlfriend, Cindi Branscum. The undisclosed Northern California site featured a 170-foot plunge towards a water-filled gorge. The festivities were attended by **Ken Drugler**, **Randy Schweickart**, **Jeff Muss**, **Alan Taylor**, and yours truly, (as well as several other MIT alumni not fortunate enough to be members of our class, and, therefore, not mentioned here). In order to preserve the ability of all attendees to obtain life insurance, the identities of those who jumped four times and those who elected not to jump shall not be disclosed. The next day featured the wedding itself in a lovely setting in Redwood forest. This was followed by a "stylin'" reception in downtown Ferndale featuring Kinta Foss as the highlight of the dance card.

We have often had the feeling that mere mention in the Class of '83 Notes can propel one to future greatness, and now **Javier de Luis** is proving it. Shortly after Javier's mention in a recent column (no, he wasn't really selling Peking Raviolis out of a truck behind Building 66), he was promoted to president of Payload Systems, Inc., in Cambridge. The company consults on and implements the integration of payloads that fly on the space shuttle, the Soviet space station, Mir, and other launch vehicles. In addition, soon after our column was published, Javier was featured on television as a space industry expert, providing commentary on the Intelsat rescue story for the New England News Network.

Also in the "Good Things Happen to Those Mentioned in the Column" category, **Peter Fader** was named recipient of the second annual David Hauck award at U-Penn's Wharton School. The Hauck award, the largest prize of its kind in any business school in the country, is awarded to the faculty member who has demonstrated "leadership ability, ability to stimulate and challenge students, and knowledge and commitment of the most current educational research." Pete is the Anhauser-Busch term Assistant Professor of Marketing at the Wharton School and was nominated for the award by the school's students. The cash value of the award approximates the net present value of tuition costs for Pete's eight years at MIT, collecting bachelor, master's, and doctorate degrees in management.

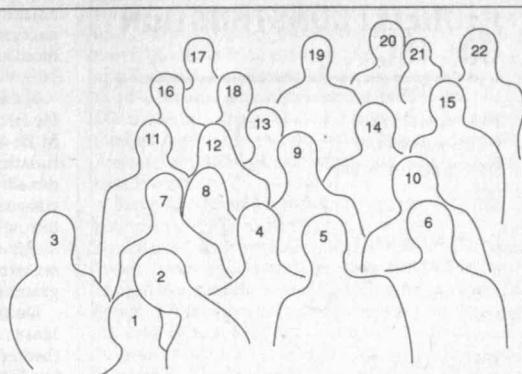
Rosa Hernandez writes that she is expecting her second child in May. Rosa notes that instead of teaching reluctant junior high kids math and science, she is now teaching aerobics to enthusiastic adults at the Melrose Family YMCA. Her two-and-a-half-year-old son, Luke, is a Sesame Street student and loves to count. Presumably, MIT is already making room in the class of 2012. . . .

Adam Blonsky writes that he and Lorraina just had their second child, Michael, on January 12, 1992. . . . **Helen Kauder** writes that she is a VP in the Financial Institutions Group at Citibank in New York, managing the Southeast Asia customer base. Home is both New York City and New Haven, Conn., where her expanding family also

lives. Rachel Marlene is now two and expecting a sibling in August. Dad is Barry Nalibuff, '80.

Kei Mu Yi has spent three years at Rice University as assistant professor of economics. Kei Mu's volleyball teams won the men's intramural championships, the co-ed championship, the four-on-four sand tournament, and the school-wide dormitory tournament. Our *Tech Review* statisticians are firing up their Cray XMP to try to determine if there has been any other individual that has won the "Grand Slam" of Rice University volleyball events. In the meantime, Kei Mu is contemplating volleyball retirement. . . . Finally, Steve "Mr. Prose" Kim writes succinctly, "General surgery residency at Wash. Univ. Med. School."

Please keep those cards and letters coming!—**Jonathan Goldstein**, secretary, c/o TA Associates, 45 Milk St., Boston, MA 02109



The wedding of Esther Racoosin (1) and Eric Alani, '84 (2) included numerous fellow alums. Attending the ceremony were Neal Kavesh, '84 (3); Jeff Yoon, '84 (4); Chris Craven, '84 (5); Dan Orange, '85, SM '85 (6); Carl Adams, '84, SM '86 (7); Monica Early (8); Andy Shooman, '86 (9); Margot Pariser, '85 (10); Mark Ensio, '84 (11); Shelle (Danziger) Ensio, '84 (12); Kim (Coldwell) Worley, '84 (13); Lori (Brill) Reubenstein, '85, SM '87 (14); Howard Reubenstein, '84, SM '85, PhD '90 (15) Vinny Natoli, '84, SM '86 (16); Brent Chambers, '87 (17); Nancy (Schuster) Natoli, '87, MCP '88 (18); Frank Worley (19); Jeff Berner, '84 (20); Christena Berner (21); Ann (Classen) Berner, '84 (22).

84

Vinod Seraphin married Mary Anne Been (UMass, '86) in May 1991 and is now working at Lotus. . . . **Lesa Aylward** and husband, Steve Warner, had their second child, Emily Marie, in October. All are enjoying family life. . . . **John Inadomi** completed his residency in internal medicine and will be going on to a fellowship in gastroenterology. . . . **Duncan Hughes** is still trying to get a helmet-mounted display on the V-22 tilt-rotor aircraft. He attended the wedding of Jeremy Grace, '83, and Rose Shlyam in March in Worcester. Also attending was H. Craig Russell, '83, who will have been married in May to Christina Karker.

Mark DeCew graduated with an MFA from USC School of Cinema-Television. He did the sound design for *The Dark Horizon*, the first student film in HDTV. He is currently working in the film unit of the L.A. County Museum of Art. . . . **Jeff Collett** enjoys being assistant professor in the Institute for Environmental Studies and the Civil Engineering Department at the Univ. of Illinois, Urbana-Champaign. He was recently honored with a Young Investigator Award from the Office of Naval Research which he will use to study the role of clouds as processors of atmospheric particles and gases. . . . **Larry Wang** went to work for National Semiconductor in Salt Lake City after graduation (many years ago). After two years he left to work for Siemens in Munich. He worked in R&D developing the 4M6 (sic) chip and was planning to head back to the States when he met his future wife. Larry came back to the States briefly but returned to Munich after three months, got a job traveling Europe with Ultratech Stepper, and was married in 1990. They moved to San Carlos, Calif., last year where Larry is a marketing manager. Larry says life is still wild and hilarious.

Richard Robbins is an attorney in corporate and securities law at Sidley and Austin in Chicago. He and his wife had their first child, Joseph Matthew, on May 26, 1992. . . . **Fred Allen** is in his second year of the biomed engineering PhD program at Univ. of Pennsylvania. . . . **Andy Davis** is the new minister of the Topsfield (Mass.) New Meadows Baptist Church. Andy was working as a

mechanical engineer and decided to begin studies at a theological seminary. After five years he received a master's of theology. Andy is married to Christi; they have a 16-month-old son, Nathaniel, and are expecting their second child. —**Howard Reubenstein**, secretary, 28 Mitchell Grant Way, Bedford, MA 01730, (617) 275-0213 (home), hbr@mitre.org

85

A natural disaster has taken their toll on a fellow alumna. **Anne Lumsdaine** and her husband barely escaped with their lives during the Oakland Hills Firestorm of October 20, 1991. Their home and all of their possessions were completely destroyed. They are now in the process of reorganizing and rebuilding. Anne, being a very sentimental person, would appreciate any pieces of MIT memorabilia which people might be able to send to her to replace some of what she lost. . . . **Lars Rosenblad** just survived a series of earthquakes and the rioting in L.A. Unfortunately he works for McDonnell-Douglas, one of the few companies which did not proclaim May 1, 1992, a holiday in honor of the disturbances. . . . **Nancy Voke** completed an MBA at Harvard in June 1991. She is now working for United Technologies in a six-month rotational program: first six months at Pratt and Whitney and now six months at Otis Elevator in New York City. Apparently the elevator business has ups and downs which need her expert attention.

Onndria Jaffe Wasem is still working at Bellcore in Redbank, N. J. She and her husband, Peter, are slowly building their home, designed by Peter, on evenings, weekends, and vacations. They plan to occupy the house in 1993. . . . **George Franks** continues to terrorize the Boston area from his home in Newton where he lives with Henry Brush, '87, and Joe Matarese, '86. George is a ceramic engineer with Ceramics Process Systems in Milford, Mass., where he works on ceramic gas turbine component development. At night he performs in the local club scene in "The Returnables," a popular band receiving plenty of support from local

alums. . . . **Willard Stanbeck** is a corporate attorney in Philadelphia. . . . **Peter Quigley's** company, Fiberspar Inc., of West Wareham, Mass., designed and built battens for the sails of America³. Formerly Fiberspar only manufactured carbon fiber components for windsurfing. . . . Sweepstakes winner **Steve Mekenian** has supplied some news on himself and fellow Zeta Psi's. Steve has worked for Towers, Perrin, Forster, and Crosby of New York city for five years, and he has completed eight of the 10 actuarial exams. He enjoys living on the east side of Manhattan where he is within walking distance of work.

Mike de Vegvar apparently survived skydiving with Steve a few years ago to graduate from Wharton in 1991. Mike now lives on the west side of Manhattan and works for Bankers Trust. . . . **Ron Chaney** is getting married on Labor Day Weekend. Rumor has it that Ron will soon complete a PhD in electrical engineering from MIT. . . . **James Lee** married Eileen Chang in L.A. in June and will be moving to Princeton, N.J. . . . **Ross Bogart** lives in London and trades stocks on the London Exchange. . . . **Matt Garrity** lives in Somerville and still works at Dynamics Research. . . . **Mark Staples** lives in Abington, Mass. . . . **Joe Hsu** has been tracked to Chicago, where he is doing a medical internship. We may hear more from him later. . . . **In Kim** has not responded, but apparently lives somewhere in Canada.

This month's sweepstakes winners are: **Lauren Barrett**, **Nancy Walworth**, and **Luis Baigorria Pera**, the lucky devils. The next two columns will feature the witty and vivacious **Stephanie Winner** who will be substituting for me while I am in Japan. Since I will have returned by the time you read this, give my parents a thrill by sending news to—**Dr. William Messner**, 8 West Winkley St., Amesbury, MA 01913. The old email address is still valid: messner@cmlsd6.berkeley.edu.

86

Last month it was the riots, this month we have earthquakes. Our power was out for over 12 hours after the two that struck near us on June 28. It's

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amazing how dependent you get on that electric garage opener. Hey, thanks for the letters this month. It looks like my pleas for news are paying off.

Harish Sangani wrote in from Houston, Texas. He left New Jersey in September 1991 for the M.W. Kellogg Co., an engineering and construction firm. Harish just finished work on a process development project to design pilot and commercial scale plants for recycling plastics which use a technology developed at RPI. He and his wife Hema will move into a new house in August and are expecting their first child in November. Congratulations!

Dennis Arnow wrote in from Cambridge, Mass., and Augusta, Maine. He is halfway through MIT's two-year Leaders for Manufacturing Fellowship program. His six-month internship is in Augusta which means he has to commute to Boston every weekend to see his wife. Dennis got married May 24, 1992 to Jacqueline Kraft in Carmel, Calif. The wedding was attended by **Rod Lehman**, **Bill Hobbis**, **Susan (Dunbar) Person**, **Mary (Bayalis) Prettyman**, his best man **James Person**, **Eric Liebler**, '85, and **Jim O'Toole** (imminent PhD). They honeymooned near Lake Tahoe at a cabin that Jacqueline's great-grandfather built in the 1920s. Before returning to MIT, Dennis worked as a manufacturing manager at a small fiber optics manufacturer in San Jose, Calif., where he found time to ride his road bicycle, train in aikido, and play tennis. Now in Boston, he has attended some jazz concerts with **Steve Offsey** who, after getting a PhD and MBA from Cornell, is now living in Brookline and working just south of Boston at a small startup company. . . . **Tom Chang** is also back in Boston at the Sloan School.

Jonathon Simon sent me a postcard from Menlo Park, Calif. He got a master's in education from Stanford in 1988 where he met and married his wife, **Stephanie West**. They both teach high school in the Bay area, he math at Mountain View High School and she English at another school. They celebrated their first anniversary in July.

Cecil Maccannon is working for AT&T in New Jersey and got married last year. . . . **Martha McKinney** of San Jose, Calif., a senior medical student at the Bowman Gray School of Medicine of Wake Forest University, has been awarded a house officer appointment for 1992-93. She will train at St. Paul's Hospital in Vancouver, British Columbia, Canada. She received an MD degree on May 18. House officer appointments are made through the National Intern/Resident Matching Program which places graduates in 64 hospitals and medical centers in 32 states, the District of Columbia, and Canada. Another student at Bowman Gray Medical School, **Vicki Modest**, was elected to membership in Alpha Omega Alpha, the national medical honor society. Vicki was also awarded a house officer appointment for 1992-93. She will train in anesthesiology at Mass. General Hospital in Boston.

General Motors has awarded **William Spangler** the coveted "Boss" Kettering Award for his invention which provided outstanding value to GM in 1991. He was one of 23 engineers and scientists who received the award this year. His invention, developed along with three other GM engineers, was an expert system which assists in designing experiments and statistically analyzing the test data. . . . **John Port** completed a PhD in May and has entered his final two years of medical school. He writes, "Married life is great!" I'd have to agree with him on that count. . . . **Bill Hobbis** is working for Siemens Medical Systems and has finished, with honors, an MBA at the University of Chicago. . . . **Ava Konishi** has put her PhD studies on hold and has taken a two-year assignment at the United Nations in India. . . . **Jaime Guillen** moved up to San Francisco last year after completing an MBA at Stanford. He is now working for Bechtel Group, Inc., evaluating major construction and engineering projects worldwide and financing their construction and operations. . . . **Greg Harrison** finally said adios to the Air Force after five

years and has found greener pastures at the Jet Propulsion Lab in Pasadena, Calif. He is working on the Galileo project doing spacecraft attitude control. He recently completed a class in improvisational comedy and is dabbling in stand-up comedy here and there. . . . **Walid Hamdy** received a PhD in electrical engineering from MIT in September 1991. Since then, he has been working at Qualcomm, a communications firm in San Diego, developing a new digital cellular standard (CDMA or Code Division Multiple Access). . . . **Mark Shelley** is working for Martin Marietta doing stress and thermal analysis for spacecraft electronics. He lives in downtown Denver and is dating a girl from Oklahoma. He enjoys skiing, volleyball, and mountain biking.

Now to news held over from last issue, with apologies from *Tech Review*. **Steven Nalesnik** is with Computer Aid in Allentown, Pa. . . . **Michelle Nearon** works for Calspan Corp. in Buffalo, N.Y. . . . **Randall Nelson** works for AT&T Bell Labs in Holmdel, N.J. . . . **Doug Norton** is with Babcock & Wilcox Co. in Alliance, Ohio. . . . **Christine Nugent** is with Roberts Associates Architects in Cambridge.

Jim Nugent is still with the Air Force, about to move to Hanscom AFB in Massachusetts. Jim, along with his wife, Sheila, will be transporting their new son there, **Conor Fitzgerald**, born on November 7, 1991. He vows to be back in Boston before the Head of the Charles. We thought he should have named his son Doppler Gauss. Jim passed on some news of his ATO classmates. . . . **Rajiv Bahl** is with Barclay's Bank in New York through June, then he's back to San Francisco. He graduated from Stanford with an MBA in 1991. . . . **Greg Frazier** is working on a PhD, along with his wife, in computer science at UCLA. Greg has a little girl and I hear is expecting another. . . . **Joe Lo** graduated from Harvard this year and Jim thinks he's moving to the Bay area. . . . **Brett Miwa** is also in the Bay area, having finished a PhD in electrical engineering at MIT. . . . **Bill Mayweather** is still at the David Sarnoff Research Center in Princeton. He was married six months ago. Congratulations, Bill!—**Mary C. Engebretsen**, secretary, 1805 Manhattan Ave., Hermosa Beach, CA 90254, (310) 376-8094

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This is it—my last article for *Technology Review*. Fortunately, I am leaving you in the capable hands of Jack Leiffer. He was elected class secretary at our 5th Reunion! Jack will be writing to you from Austin, Tex., where he is working on a PhD. I'll let him fill you in on the details. **Jim Lin** will remain the class treasurer, **Jim Koenig** was elected class agent, and I was elected president. (Special thanks to **Lowell Kim** and **Jay Cohan**!) I've already started planning our 10th Reunion—and I promise, no disco music!

Before I hand over the reins, here is the latest scoop: The reunion was a great success! It was nice to see old friends, and make some new ones. Almost everyone at the reunion promised to write a letter to their class secretary so Jack should be off to a great start.

Mike Nowak writes: "After actually recognizing the names in the *Tech Review* two months in a row now, I decided that I'd keep up the trend. . . . After five years, I'm finally graduating with a PhD from Stanford University (Physics Department), and I'm off to the Great White North. I'll be starting a post-doc at CITA (the Canadian Institute for Theoretical Astrophysics) in Toronto, sometime after the Minnesota State Fair (maybe this year they'll have Donkey Diving). My geriatric dog, Scruffy (a.k.a. SolarPup) will be moving with me. (He just celebrated his 16th birthday and will probably outlive me.) In other minor highlights, I ran into **Jon Slater** at the Opera and he's doing quite well. **Darlene** ('88) and **Carlos Flores** stopped by in October on their way to Yosemite, and I saw **Champ** in Virginia this past October. . . .

So, anyone passing through Toronto during the next two years, stop by and say "Hi" to me and Scruff."

Linda Elkins writes: "I'm living in Annapolis, Md., with my husband, Curtis Bohlen, and our new baby boy! Our son, Turner Kolbe Bohlen, was born April 7, 1992. I'm also running my own business, writing business plans for companies seeking capital. I do most of my work with high-tech groups."

It was great to hear from **Maria Kozloski**. She sent me a letter late spring while she was visiting the States for a week. Maria is living in Warsaw, Poland, where she works for Price-Waterhouse advising the Ministry of Privatization. She writes: "The experience of living and working in Eastern Europe has been great. In June, I'll have been there one year. Our biggest project is to make recommendations for the privatization of 32 companies in the glass industry. I have ten companies that manufacture construction and automotive glass that I'm working on; one of these will hopefully complete a joint venture with a British company to bring new technology to Poland. I've been to all sorts of obscure places throughout Poland to visit these companies. In many cases you feel like you're going back years in time. And, lots of the communist influence exists—overmanning, for instance. Nothing is computerized—all records are kept by hand, and, of course, the whole infrastructure (like the phone system) is way behind. The most frustration comes from working for a government that now lacks a clear vision about how to complete the move to a market economy. Poland's current government is very fragmented and it's uncertain how long it will last. By working for the Ministry of Privatization, we definitely feel the impact of government strategy. The whole idea of privatizing state-owned enterprises is very controversial." Thanks for writing and good luck!!

The *Technology Review* office sent me the following information: After graduating from Harvard Business School in 1991, **Grace Ueng Trombetta** married and moved to Minneapolis to work in marketing for General Mills. . . . **Gregory Procopio** is living in Gardena, Calif., and is hard at work designing a communication satellite for the Navy. . . . **Jonathan Aronson** is currently a graduate student in the Math Department at Carnegie Mellon University. . . . **Karen Bardeen** is currently finishing her second year of teaching high school in Oak Park, Ill. In addition to teaching chemistry, she is involved with the Technology Department at her high school. After receiving tenure, Karen is looking forward to getting involved in more technology projects next year. . . . **Jeff Kiohr** writes: "I'm filling this out during one of my last graduate courses in my current program (which should surprise no one). In December 1991, I completed an MS in management of technology at Washington University and I will finish a master's of engineering management program in May 1992. Now that I've done all of this, I'm ready to go out and start a travel company. (Any good idea out there?) I'm still working at McAir on the F/A-18 and still playing a lot of volleyball. This past February I went skiing with my sister, some friends from home, and **Steve Mackler**. I manager to break both bindings on my skis on the last run of the last day. Makes for a long walk! In March 1992, I went to France for 11 days with nine friends, including Rod Moreno, and Josh Spielman, '88. **Maria Kozlowski** wanted to meet us in Paris, but turning Poland into a capitalist free-for-all kept her away."

Congratulations to **Lori Locascio** of Arlington, Mass. She was recently elected president of Boston Area Solar Energy Association. . . . **Tamar Moore**, now studying at Brown University, was quoted in a *Providence Journal* feature on the difficulty of attracting women to science: "My colleagues are very supportive, and partly that's because I am a woman in science. But I know very few other women physicists here, especially of the older generation. So I don't have many reference points,

and that's scary."

Navy Lt. **Edward Cashman** recently received the Navy Achievement Medal. Edward was cited for superior performance of duty while serving as the main propulsion assistant aboard the guided missile cruiser USS *Arkansas*, homeported in Alameda, Calif., where he is currently assigned. In support of Operations Desert Shield and Desert Storm, Edward contributed significantly to the success of the United States' efforts in Southwest Asia.

The *Carlisle Mosquito*, of Carlisle, Mass., published an article about Minuteman Tech, the Vocational High School that **Phillip Churchill** attended before MIT. After graduating, Phillip went to work as an engineer for Arthur D. Little Company in Cambridge. In 1990, he enrolled in a master's program in astro-engineering at the University of Maryland, where he has been reunited with his former MIT professor to work on a multi-million dollar space facility.

This paragraph, the last item to be included in Stephanie's last column, was not even written by Stephanie. This paragraph was guest written and secretly put in this column by me, Jim Koenig. As Stephanie wrote this last column, she closed a special chapter in her life as our class secretary. At the same time, she began a new chapter—not only as our class president, but as my bride. During the July 4 weekend, as a surprise, Stephanie and I flew to New Orleans where I asked her to marry me. I guess this is a fantastic ending to what now promises to be a wondrous beginning. I LOVE YOU STEPHANIE!

Now back to Stephanie. . . .

I hope you have enjoyed reading these columns as much as I have enjoyed receiving your letters and writing all about my classmates. If you'd like to contact me, **Stephanie Levin**, I can be reached at 230 Central Park South, Apt. #2D, New York, NY 10019, (212) 397-9616, or at work: NYC Office of Management and Budget, 75 Park Place, 9th Floor, New York, NY 10007 (212) 788-6450. GOOD LUCK EVERYONE!

And don't forget to write to your Class Secretary: **Jack Leiffer**, secretary, 2703 Swisher St., #202, Austin, TX 78705

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5th Reunion

I hope everyone had a good summer. . . . **David Barnes** of Boxborough, Mass., has been promoted to engineer for New England Power Service Co., the service subsidiary of New England Electric System, a public utility holding company headquartered in Westborough. Barnes joined NEPSCO in 1988 as an assistant engineer and later served as an associate engineer until his promotion.

Many thanks to **Waldo Best**, who updates us on some alumni from the Philadelphia area. . . . **Clifton Larsen** is a software engineer at GE-Valley Forge, Pa. . . . **Brian Cooke** is doing facility design and planning for McNeil Pharmaceutical in Fort Washington, Pa. Brian will be attending either University of Penn Wharton, University of Michigan, or University of Chicago for business school. He will be studying finance. . . . **Reggie Tucker** is a biomedical engineer for Hewlett-Packard in Andover, Mass., and got married last year. He is also a member of the MIT Corporation. . . . **Willie Baldwin** and **Stephanie Wiggins** were married in March. Congratulations! Waldo is leaving his position as manufacturing engineer of rolling at Lukens Steel in Coatesville, Pa., to attend NYU Stern School as a consortium fellow in the fall and will be stepping down as the Philly area BAMIT coordinator and Philadelphia Ed Council vice-chair. . . . Further contacts for Philly BAMIT should be referred to Sean Cadogan ('89) at (215) 531-5204.

Darius Sankey is currently living in Rochester, N.Y. He will be finishing up a PhD in optics at the University of Rochester within a year. He is still trying to decide what to do next and welcomes any suggestions. . . . **Marek Niczyporuk** has been

running a consulting practice in machine vision and computer image processing since 1990. His work has industrial, medical, and commercial applications. . . . **Florence Rolston** is currently a third-year student at Morehouse School for Medicine in Atlanta, Ga., and is active in Alpha Omega Alpha and the American Medical Student Association Alcohol and Substance Abuse Prevention Project.

Navy Lt. **David M. Silldorff** has recently returned with Tactical Electronic Warfare Squadron-140, Naval Air Station, Whidbey Island, Wash., from a six-month deployment. While aboard the aircraft carrier USS *Dwight D. Eisenhower*, Silldorff participated in exercise in the Atlantic Ocean, Mediterranean Sea, Red Sea, and Persian Gulf, as well as in the NATO multinational exercise "Teamwork 92" in the Norwegian Sea. . . . Congratulations are in order for **Gregory Martin** and Nancy Palmer (MHC '85), who were married last June. They honeymooned in Spain and spent the rest of the summer in Geneva working at the World Health Organization. Now Greg is working on a PhD in mechanical engineering at MIT.

Brenda Chin is a junior associate with General Atlantic Partners in New York City. She spends her free time as a director of the Asian Professional Extension (APEX), a nonprofit organization involved in community outreach activities. She is excited about the APEX Mentor Program, which will provide Asian American role models for Asian American high school students. She encourages interested CAMIT members to participate in the 1992-93 year; if interested, call her at work at (212) 888-9191.

Thanks to everyone who's written. Please note (yet another!) new address.—**Grace Ma**, secretary, 155 East 29th St., #32H, New York, NY 10016, (212) 447-1925

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There isn't much news this month, so I'm going to try something new next month and see if it works out. Next month, I'm going to pick some random names from the Alumni Register and ask that they write in. Meanwhile, won't you drop us a note? Thanks!

Seth Ostrow just graduated from the Boston University School of Law magna cum laude, and spent the summer preparing for the New York and Mass. bar exams. Seth married Naomi Strubel, '91, in August. Naomi is entering medical school this fall. As of this writing in July, Seth was weighing his options for this year—he is considering going back for an MS in computer science or electrical engineering, as he would like to practice patent law. . . . **Eric Reifschneider** graduated magna cum laude from Harvard Law School, where he served as an executive editor of the *Harvard Law Review*. In September, Eric began working in the corporate law department of the Chicago law firm of Katten, Muchin, and Zavis.

Anna Napolitano is a securities analyst for the buy side of a money manager. Before moving jobs last November, she was working with IBM. Anna has also signed on with a professional acting company, and is also a professional dance instructor, working through the YMCA. Recently, Anna was in "Sulor Angelica," and is currently studying voice. . . . **Angeli Salgado** graduated in June, and will be moving out to the Palo Alto area to look for roommates in the fall.

I ran into **Kim Stopak** at a party recently. Kim is lives in Porter Square and has just finished her first year at Northeastern Law School. Kim is really enjoying school, and also has been practicing piano on her recently acquired upright. . . . **Joseph Garrison** is currently aboard the amphibious transport dock USS *Duluth*, homeported in San Diego, and has just finished a six-month deployment to the western Pacific and Indian Ocean. Joseph has participated in Edged Mallet, a routine amphibious readiness exercise which took place in

the vicinity of Mombasa, Kenya, and included air and surface assault landings.

Sandra (Murray) Skov and her husband, Eric, had their first child, Sarah Elizabeth, on January 20, 1992. . . . **Virginia Merlini** received an MA in socio-linguistics from Univ. of Pennsylvania in 1991, and is working toward a PhD in sociology at the University of Connecticut. Virginia has been learning how to play polo and showjump in UConn's horse practicum. . . . **Michael Mills** writes that, "As a gay man, I am having to devote much of my energy to fighting the reactionary group Colorado for Family Values, which has mounted a campaign to make discrimination based on sexual orientation legal." Michael is "also studying the deterioration of the ozone layer with Dr. Susan Solomon at NOAA, and will be travelling to Antarctica in the fall." Mike recently passed PhD comps at the University of Colorado.

Tibor Toth writes that "I am still working as an associate for a private equity investment firm called Berkshire Partners in Boston." Tibor was married on May 16th to Jennifer Cushing. Tibor has just started grad school this fall in a joint manufacturing program with business and engineering. . . . **Greg Markham** is working for NASA in Cleveland while pursuing a master's degree part-time. . . . **Bill Cummack** is working for Solomon Brothers in New York city. . . . **Nikola Chin** is completing her third year at Temple Medical School. She recently finished an internship in psychiatry in Allentown, Pa. . . . **Heather Huber** is in a joint program at Wharton School of Business, where she is working on an MBA, and the Engineering Department, where she is working on an MS in systems engineering.

That's it for now. If the news doesn't come rolling in, there won't be much of a column next time!—**Henry Houh**, secretary, 4 Ames St., Cambridge, MA 02142, (617) 225-6680, e-mail: tripleh@athena.mit.edu or henry_houh@mit.edu

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Hello everybody! In June, **Chris Fennema Notestine** received a master's in psychology from UCSD. She's now continuing her studies in the PhD program and doing research on memory in aging and dementia. . . . **Nuran Cinar** is in graduate school at Johns Hopkins University in Baltimore, Md. . . . **Todd Sachs** is working towards a PhD in electrical engineering at Stanford, and **Steve Duncan** is finishing up a master's in materials at the University of Virginia. . . . **Charles Li** is at the University of Minnesota Medical School/Minneapolis, and has just completed two years of clinical science courses while doing research in general surgery. In June, Charles took Part 1 of the U.S. Medical Licensing Exam. . . . Across the Atlantic, **Priti Paul** is studying at the Architectural Association in London. At the same time, she's also managing the London office of her family's business. . . . Also in London is **Eloisa Tejero**. Eloisa is on a temporary assignment for work. . . . **Denise Kato** is working at Martin Marietta Astronautics in Colorado. . . . **Irene Thanos** is employed at Research and Development Corp. She's involved in audio digital signal processing, professional DSP audio hardware prototyping, and processing algorithms.

News from folks in Pennsylvania . . . **Sean Cadogan** is an Edison engineer at GE/Valley Forge. He's also studying E&M and optics at the Villanova Graduate School of Electrical Engineering. . . . **Heather Huber** is studying for a dual MBA/MSE degree in business and systems engineering at the University of Pennsylvania/Wharton. . . . **Candice Jennings**, '91, works as a systems engineer at GE/Valley Forge while doing some graduate work at Penn State. Candice and Bill Buckner, '91, are engaged to be married later this year. . . . Down in Florida, **Michael Markham** is completing his Navy ROTC commitment. . . . Out

west in Berkeley, Calif., **Ed Page** is working for Pac Tel while starting up his own business! . . . **Vijay Vaitheswaren** was recently interviewing in San Francisco. There he met up with **Erica Wickstrom**, Ron Koo, '89, Brian Murphy, '89, and Scott Geels, '89.

On April 11, **Renee Picard** married her high school sweetheart Donald Parry. The wedding was held in Quincy, Mass., but they now reside in Bellevue, Wash. Among those attending the wedding were: **Frannie Smith**, **Margaret Coughlan**, **Chris and Honor Passow**, **Helen Delichatsios**, **Mark Strong**, **Lisa Robinson**, '89, **Laura Brauer**, '89, **Dave Walker**, '91, **Pratima Rao**, '92, and **Joanne Cummings** from MIT Admissions. Frannie and her boyfriend drove out to the wedding from Ann Arbor, Mich. They spent the week in Boston and on the way back to Ann Arbor, they bought 30 lobsters!

Couple of honors/awards to announce. . . In June, **Allison Arnold** received a master's degree in Course II from MIT and was chosen for a one-year appointment to the U.S. Olympic Training Center in Colorado Springs, Colo., to work on sports biomechanics research. At MIT, Allison had specialized in biomechanics at the Newman Laboratory for Biomechanics and Human Rehabilitation. Allison was only one of three students in the U.S. who was offered a research position at the center. . . . **Charles Wong** has been selected as a winner of one of the 1992 Graduate Student Awards given out by the Division of Environmental Chemistry of the American Chemical Society. Congratulations!

Well, looks like it's been over two years since we all graduated from the Institute. . . . How's everyone enjoying the corporate world, graduate school, or other endeavours? Send news to **Ning Peng**, secretary, 355 South End Ave., 27G, New York, NY 10280.

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Two happy items come to us from Waldo Best, '88: **Bill Buckner** and **Candice Jennings** are engaged to be married later this year, and **Janae Byers** is engaged to **Andrew Frazier**. Bill is an Edison engineer at GE/Morristown and Candice is doing systems engineering at GE/Valley Forge while doing graduate work at Penn State part-time. Janae is pursuing a master's in computer science at the University of Pennsylvania, and Andrew graduated from Navy Supply School in Athens, Ga., and is completing his Navy-ROTC commitment in Virginia.

Seema Nundy is working as a knowledge engineer in graduate school and is earning a master's in cognitive science at the University of Toronto. . . . **Jason Sherman** married Patricia Anderson (Wellesley, '91) on August 8, at Brooks School in North Andover, Mass., and will continue to reside in Seattle. . . . **Nicola Bird**, who works as an environmental consultant for CDM Federal Programs Corp., worked onsite at an EPA project in Vega Alta, Puerto Rico. . . . **Chris Keith** is working as process engineer in Intel's Mask Manufacturing Department. His current project includes the 586 and resist development.

Regina DeLorenzo is doing an internship at a veterinary hospital in New York, earning time for veterinarian school, which she hopes to attend in fall 1993. . . . **Emil Dabora** is doing a summer internship at the World Bank in Washington, D.C. . . . As for me, I'm now working at a legal internship with the Environmental Protection Agency in Boston.

Garrett Love is in the Teach for America program and is putting his engineering degree to use teaching high school algebra in the Arkansas Delta. Garrett's home was one of the hot spots **Darren Frechette** visited on his nation-wide tour before Darren headed to graduate school at North Carolina State. Darren finished his double degree in mathematics and economics in January. Garrett sends news about several other class-

mates. . . . After a brief stint in the Navy's Nuclear Submarine program, **Jerry Sheldon** is now continuing his Navy career as a civil engineer based in Virginia. . . . **Dave Taylor** is keeping busy in neural network research with a small company in Stamford, Conn. . . . **Brian Bolton** returned home to a company in Kirksville, Mo., and began his career by leaving home to work in Japan. . . . **Rellen Hardtke** will be doing actuarial work in Maryland, and **Dennis McNabb** and **Yvonne Chen** were married this past November. Dennis will return to graduate study in physics in the fall.

I am playing softball at MIT this summer with the Phi Sig team, so I have seen a few other classmates. On a cold, rainy Friday we played **Brian Kelly's** Kappa Sig team. It rained more than water and they won. On a sunnier day, I saw **Andrei Saunders** and **Andy Parsons** preparing for a summer's bike ride around Boston. And today—on my way back home to type this letter up—I saw **Poorti Srivastava** on the T. We had glimpsed one another early in the morning and usually didn't get to talk, but today we had a long enough conversation for me to get a full report. She is working for Charles River Associates and was living at the time with **Shaheen Mohamedi**, her old roommate from Burton. Shaheen had just finished a master's at MIT and is now working for Intel in Chandler, Ariz.

I look forward to hearing news about your summer travels or internships. Please send along a little postcard and this column will be heavy with news.—**Andrew Strehle**, secretary, 12 Commonwealth Ct., #10, Brighton, MA 02135, (617) 232-2261

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Class of 1992: Teaching Fund Provides Loan Relief

Graduates of 1992 who teach in public schools this fall are eligible for a loan forgiveness program funded by the Class of 1991 Gift. *The deadline for applying is October 16, 1992;* the awards will be announced October 30. To qualify, applicants must have a contract or an equivalent job commitment to teach full-time at the K-12 level in a public school for at least one academic year. Contact the offices of the Council on Primary and Secondary Education, Room 8-202, MIT; or call (617) 253-4698.

The MIT Teaching Fund will run for the next five years and will be available to students receiving undergraduate degrees from MIT during that period. For 1993 graduates, the application deadline is December 1, 1992.

The Class of '91 senior gift created the MIT Teaching Fund out of concern for the current state of American primary and secondary education, and to endorse teaching at the K-12 level as an important career focus.

I CIVIL ENGINEERING

Chiang C. Mei, a Course I professor affiliated with the department's Ralph M. Parsons Laboratory, has received the 1992 John G. Moffat-Frank E. Nichol Harbor and Coastal Engineering Award. It is given by the Waterway, Port, Coastal, and Ocean Division of the American Society of Civil Engineers. . . . **Charles Shiu Wong**, '90, SM '92, has been selected as a winner of one of the 1992 Graduate Student Awards given by the Division of Environmental Chemistry of the American Chemical Society. . . . **Gavin Gong**, has been awarded a National Aeronautics and Space Administration graduate student fellowship for the duration of his graduate studies at MIT. He works on landsurface hydrology representations in atmospheric general circulation models.

II MECHANICAL ENGINEERING

David Dombrowski, SM '83, manager of advanced manufacturing engineering at GE Aircraft Engines in Evendale, Ohio, sends word: "My wife, Nancy, a retired court stenographer, and I were recently blessed with our second son. Matthew James Dombrowski was born March 29, 1992. His brother, Christopher, 27 months, took to big brothering instantly." . . . Colonel **Charles J. Jeffus**, SM '39, is a military advisor at the Center for Defense Information in Washington, D.C.

From Boonton, N.J., **Peter Kalustian**, SM '34, writes: "My usual routine continues and my health is good. My daughter and her husband live next door with my grandson, Karl, who is headed for Stevens Institute of Technology this fall. My granddaughter, Clare Marie, is getting ready to go to college in September 1993, as yet not determined. It's been a good year for my downhill skiing. I have skied some 65 days, mostly local but also in New York State, Colorado, and Utah. I do have gold and silver Nastar pins and was given a plaque by my 70+ Ski Club (some 8,000 members) for the 'fastest 80-year-old skier.' I may go skiing in New Zealand this summer, along with a business trip to Australia. Outside of the above, my international consulting business in the field of fats and oils processing keeps me young and active."

Darrell A. Frohrib, '52, SM '53, professor of mechanical engineering at the University of Minnesota in Minneapolis, and **Said Jahanmir**, SM '73, PhD '77, leader of the tribology group at the National Institute of Standards and Technology in Gaithersburg, Md., have been elected Fellows of ASME. According to *ASME News*, "Frohrib is a major contributor to a number of areas in engineering education and research. He and two faculty members of his university's Department of Neurology initiated the first successful biomechanical implant devices to serve patients with genito-urinary dysfunction. The inflatable and two-phase incontinence and impotence prostheses industry has become an international industry, from laboratory models developed by Frohrib and his partners." Jahanmir's research interests are tribology and machining of advanced materials. "His research on wear mechanisms and mechanics of

wear contributed to the acceptance of the delamination theory of wear. More recently, his research results on ceramics provided a fundamental understanding on the wear of mechanisms for these new materials, and his suggested wear transition diagram for ceramics is gaining acceptance as an efficient means for presentation of wear data."

Mark Torpey, SM '87, has been selected as a Leadership Development Initiative intern by ASME. The purpose of the initiative is "to introduce ASME's programs to young engineers, and, at the same time, receive input from young engineers on issues and initiatives within each of its councils." Torpey will work with the Council on Engineering, which directs the technical interests of the Society. Torpey is currently a development engineer for Foster Wheeler Development Corp. in Livingston, N.J. After joining the firm in 1987, he initially worked in environmental engineering and subsequently in energy conservation research. He is currently involved with the design and development of a pilot-scale demonstration unit of a 500-MW integrated combined-cycle coal gasification plant for electric power generation. . . . **Fred Landis**, SM '49, ScD '50, professor of mechanical engineering at the University of Wisconsin at Milwaukee, has been named VP for basic engineering of ASME, a volunteer office. . . . **Balkrishna S.**



B.S. Annigeri

Annigeri, ScD '84, a senior research engineer at United Technologies Research Center in East Hartford, Conn., has been honored for his outstanding achievements and contributions during 1991. He received a cash award and was presented with a certificate of recognition from his employer. Annigeri developed a unique computer code that can be used to assess the fatigue life and safety of structural components.

Avraham Benatar, '81, SM '83, PhD '87, received the Adams Memorial Membership Award from the American Welding Society. The award recognizes educators for outstanding teaching activities in their undergraduate and postgraduate engineering institutions. Awardees receive a four-year membership in the society, a certificate, and all current volumes of the *Welding Handbook*. Benatar is an assistant professor of welding engineering at Ohio State University. He specializes in the joining of plastics and composites, welding design, and manufacturing and production engineering. Benatar is a researcher, author, speaker, and consultant in the multidisciplinary field of joining of plastics and composites. He is also a pioneer in the research of ultrasonic welding. . . . *Route 128: Lessons from Boston's High-Tech Community* (Basic Books, 1992), is a new book by Susan Rosegrant and **David Lampe**, SM '76. According to the book jacket, "Route 128 is a story of idealism and entrepreneurship, of ivory-tower intellectualism and practical Yankee ingenuity, of individual dreams and cooperative efforts—the search for new knowledge and the drive to put it to work. The book tells how a stretch of highway circling Boston became one of the nation's best-known centers of high-tech industrial innovation." Lampe is assistant director of

MIT's Industrial Liaison Program.

The Association of Alumni and Alumnae has been notified of the following deaths: **Anthony S. Fiksdahl**, SM '50, of Norway, on July 31, 1990; **William R. Niedhamer**, '45, of Orville, Calif., on March 8, 1991, and **Pasquale Fischetti**, SM '50, of Oakland, Md., in 1990. No further information was provided.

III MATERIALS SCIENCE AND ENGINEERING

Several Course III alumni were honored at the American Welding Society Awards banquet in Chicago, Ill., on March 25, 1992. **George R. Spies**, '42, received the Safety and Health Award, presented annually to an individual recognized for "promoting welding safety and health through research, educational activities, developing safe practices, or disseminating information through publications or other means, thereby fostering public safety awareness and welfare." Spies worked for The BOC Group (formerly the Air Reduction Co.) for 43 years. In the 1970s, he entered the areas of product safety and product liability. He became the company's first manager of product safety for welding products and compressed gases, and subsequently the corporation's product safety manager for all product lines. This period was noted for extensive activity in the preparation of material safety data sheets, upgrading product safety labeling, and related employee and public safety projects. **Gerald A. Knorovsky**, ScD '77, a senior research member of the technical staff in the Physical and Joining Metallurgy Department at Sandia National Laboratories, received The William Spraragen Memorial Award. The award is presented for the best paper published in the research supplement section of the *Welding Journal* during the previous calendar year. The award honors William Spraragen, a founding member of the society and the first editor of the journal (1922-54). Knorovsky's paper was entitled, "A Study of Melting Efficiency in Plasma Arc and Gas Tungsten Arc Welding." Knorovsky's work at Sandia have involved research and engineering activities in the fields of welding, brazing and soldering, solidification, fracture mechanics, heat treatment, packaging of heat-sensitive components, and failure analysis. He is especially interested in the fields of inert gas shielded arc processes and resistance welding as applied to small hermetic packages and electrical interactions.

Thomas W. Eager, '72, ScD '75, Director of the Materials Processing Center, the Richard P. Simmons Professor of Metallurgy, and the Leaders for Manufacturing Professor of Materials Engineering, all at MIT, received two awards: The Comfort A. Adams Lecture Award, and the 1991 Charles H. Jennings Memorial Award. The Lecture Award is presented to an outstanding scientist or engineer for a lecture describing a new or distinctive development in the field of welding. Eager's lecture "The Science of Welding and Joining Processes" was presented at the Annual Meeting of the Society. The AWS created this lectureship in memory of Comfort A. Adams, its founder and first president. The Memorial Award is presented for the most valuable paper written by a college student or faculty representative published in the *Welding Journal* during the previous calendar year. Eager's paper

VI-A: the Ultimate Reality Check

After operating for three-quarters of a century, during which it has given 3,200 MIT students practical experience in electrical engineering and more recently in electronics and computer science, Course VI-A (and its successor, the VI-A Internship Program) has surely established itself as one of the Institute's success stories. Nearly 100 alumni/ae and guests gathered on campus for VI-A's 75th birthday symposium, a component of Reunions '92. They reminisced about the past, but clearly the future will be just as strong.

For starters, VI-A remains very popular with students and industry, and the Department of Electrical Engineering and Computer Science (EECS) plans to expand it. Typically, 90 sophomores have been admitted to the program every year, according to Professor Campbell Searle, SM '51, the director of graduate programs for EECS. He says that number will gradually be increased to 120 students entering each year. Enlarging the program will respond to unmet student demand and also make room for a number of the 50 companies presently on the waiting list. Moreover, the department's plans to offer a new five-year program that takes undergraduates directly to a master's degree will focus new attention on VI-A as both a model and a significant source of student financial support.

In anticipation of the anniversary, Professor J. Francis Reintjes, director of VI-A from 1960 to 1969, and John A. Tucker, director from 1969 to 1987, collaborated on a thumbnail history of the program.

A "cooperative course" in electrical engineering was discussed at MIT as early as 1907, they say, less than a year after this concept for combining practical work experience with undergraduate engineering training was pioneered at the University of Cincinnati. MIT's founder, William Barton Rogers, strongly emphasized "learning by doing," and he believed that professional education was of great importance to industry, so the concept of a co-op program found a responsive audience at the Institute. Early advocates included both Magnus Alexander, a major figure in engineer-



ing design at General Electric's works in Lynn, Mass., and Professor Dugald C. Jackson, then in his first year as head of the Electrical Engineering Department.

The program won faculty approval in 1916, and the first class of 20 MIT students was recruited by GE in 1917. Then, as now, the undergraduates were committed to four work periods during a five-year MIT curriculum leading to both SB and SM degrees; students wrote a master's thesis based on a major company assignment, under the combined supervision of a company employee and an MIT faculty member.

Interrupted by World War I and restarted in 1919, Course VI-A was an immediate success, with new companies—and more students—affiliating nearly every year.

VI-A has retained the same basic format with only evolutionary changes. Plants in the South and on the West Coast were added in the 1970s, and enrollment reached a peak of just under 400 in 1984. It was redesignated the VI-A Internship Program in 1985.

VI-A now has 25 cooperating companies offering employment at 33 locations, according to Kevin J. O'Toole, NE '57, VI-A director since 1987. The average class of 90 (chosen from almost twice that number of applicants), is typically 20 to 25 percent of all EECS majors. A faculty adviser is named for each VI-A site to help students

Elwyn Berlekamp was able to totally stump his colleagues at the VI-A reunion in June with one of the games he proposed. Berlekamp is considered an expert in game theory and coding, and he dates his interest in the field to his VI-A assignments in circuitry and logic at Bell Labs.

and assure work assignments that are appropriate to the students' backgrounds and interests, and additional faculty serve as thesis advisers.

Is Impossible Hard Enough for You?

"VI-A students are routinely challenged to do more than they think they can do," Department Head Paul L. Penfield, Jr., ScD '60, said at the anniversary gathering, "and invariably they just get out and do it."

For example, said Penfield, consider an episode at Boston Edison Co. in which the VI-A director was complaining that the company's assignments for its VI-A students were not tough enough. So Boston Edison responded by giving an MIT student a problem GE had concluded was unsolvable: eliminate the random, frequent, and frustrating outages in an important microwave communications link between corporate headquarters in Boston and offices and stations on the South Shore. The student found the solu-

was entitled, "Analyses of Electrode Heat Transfer in Gas Metal Arc Welding." ... William F.



W.F. Schilling

Schilling, ScD '69, has been elected president and CEO of Autoclave Engineers, Inc. He also has been appointed to the company's board of directors. Schilling joined Autoclave in 1989 and was named president in June 1991.

The Association of Alumni and Alumnae has been notified of the following deaths: **Armand P. Bond**, ScD '58, of Livonia, Mich., in 1986; **Charles S. Kuebler**, SM '35, of Summit Hill, Pa., in 1988, **Phillip L. Farnsworth**, ScD '65, of St. George, Utah, in 1991; and **George L. Tuer, Jr.**, ScD '55, of Aiken, S.C. on March 5, 1991. No further information was provided.

IV ARCHITECTURE

C. Mark Strand, SM '84, writes: "I am currently an assistant professor of mass communications at Moorhead State University in Moorhead, Minn." ... From Waltham, Mass., **Ernest E. Kirwan**, MAR '59, sends word: "I am a partner in the firm of Keyes Associates Architects/Engineers/Planners. My recent clients include Polaroid Corp. (New Helios manufacturing facility), WGBH/Channel 2, WBZ/Channel 4 (new facilities), Massachusetts Biotechnology Park, and the University of Rhode Island."

Amer A. Moustafa, SM '89, reports: "I am pursuing a PhD in urban planning at the University of Southern California." ... **Alex L. Seid**, MAA '74, writes: "I moved to San Francisco and joined Bechtel Aviation Services as deputy manager of Aviation Planning."

From Montreal, Canada, **Radoslav Zuk**, MAR '60, reports: "An exhibition of churches designed by me, in association with or as a consultant to several architectural firms in North America, has been traveling since the summer of 1990 through major cities in the Ukraine, including Kiev, Lviv, and Kharkiv."

Phillip A. Kupritz, MAR '62, professor of architecture at the University of Illinois at Chicago, was among 11 UIC faculty members selected to receive the Silver Circle Award for excellence in teaching. Kupritz was given \$500 and a plaque. Award winners are determined by the senior class. Kupritz, who joined the UIC faculty as a lecturer in 1965, currently teaches graduate and undergraduate courses in design.

Ellen Sebring, SM '86, a research fellow at the Center for Advanced Visual Studies at MIT, is one of 12 women selected from 400 applicants for the Direction Workshop for Women (DWW) at the American Film Institute in Los Angeles. The workshop gives a first-time opportunity to direct a narrative film to mid-career women who have distinguished themselves in documentary filmmaking, video art, choreography, music, writing, or acting. Each workshop participant directs a 30-minute film, using funds and equipment provided by the American Film Institute. Sebring's film, "Evidence of June," is an adventure/coming-of-age story of two sisters rendered as a modern fairy tale.

Vivian Fung, MAR '85, has been appointed an associate at the Boston architectural firm of Shepley Bulfinch Richardson and Abbott. She has been with the firm since 1986. Fung has recently completed the design phase on the Case Western Reserve University Macromolecular Research Laboratory and is currently project designer for the James Cleveland Federal Courthouse Annex in Concord, N.H.

V CHEMISTRY

Thomas R. P. Gibb, PhD '40, sends word from Dover, Mass.: "I exchange letters from time to time with several former students. I didn't begin to feel old until my students (1936-46) started to retire!" ...

Lan K. Wong, PhD '77, writes: "I became director of research and laboratory at Biovail Corp. in Toronto. I am in charge of pharmaceutical R&D, bioavailability, and bioequivalence studies." ... **J. Throck Watson**, PhD '65, is a professor of biochemistry and chemistry and director of the Mass Spectrometry Facility at Michigan State University. ...

Patricia A. Bianconi, PhD '86, assistant professor of chemistry in the Eberly College of Science at Penn State University, is one of 13 young faculty members throughout the country to receive a Dreyfus Teacher/Scholar Award, and one of 12 to be honored as a 1992 Beckman Young Investigator. The Teacher/Scholar award recognizes outstanding ability as a chemical educator and researcher and consists of a \$50,000 grant administered by the Camille and Henry Dreyfus Foundation. The Young Investigator award, which is in its second year of existence, is intended to promote research in chemistry and the life sciences and to foster the invention of methods, instruments, and materials that will open new avenues of research in science. Bianconi will receive a grant of \$175,000 over a two-year period funded by the Arnold and Mabel Beckman Foundation. A specialist in inorganic chemistry, Bianconi plans to use both awards to perfect a process for creating synthetic materials that mimic the qualities of teeth and bones. She already is the first scientist to have developed a material that, like bone, has crystals of a similar size and shape that are all oriented in the same direction, but she says that she and her research team are still years away from creating a substance that can actually replace what nature provides. Bianconi's work has potential applications in magnetic materials and fiber optics and could lead to the development of improved synthetic bones, teeth, and prostheses.

Edward C. Hermann, PhD '49, is president of the Delaware Academy of Science, an affiliate of the AAAS. ... **Sylvia Teresse Aida Ceyer**, Course V professor at MIT, has been elected a Fellow in the Chemistry Section of the American Academy of Arts and Sciences. ...



D.M. Smyth

Donald M. Smyth, PhD '54, the Paul B. Reinhold professor of Materials Science and Engineering and a professor of chemistry at Lehigh University, has been honored by the Center for Dielectric Studies at Pennsylvania State University. He was presented with the 1992 Wilhelm R. Buessem Award for his outstanding contribution to the field of ceramic dielectrics, those materials that do not conduct electricity. Buessem is a retired professor of ceramics at Penn State and a pioneer in the field of ceramic dielectrics, which he first studied in Germany in the 1930s. ... MIT Institute Professor **John Waugh** received the Theodore William Richards Medal for Conspicuous Achievement in Chemistry at Harvard University last April. ... MIT faculty members **Richard R. Schrock**, the Frederick G. Keyes Professor of Chemistry, and **JoAnne Stubbe**, the Ellen Swallow Richards Professor of Chemistry and professor of biology, have been elected to the National Academy of Sciences for their "distinguished and continuing achievements in original research." Schrock and Stubbe are two of eight MIT faculty members elected to the NAS this year. ... **Mark S. Wrighton**, provost and Course V faculty member, was among six Caltech graduates to be honored with Distinguished Alumni awards at the

tion: move the line-of-sight transmission path to avoid interference from a frequently raised drawbridge.

Many students report formative experiences with their VI-A employers. Elwyn R. Berlekamp '62, an expert in game theory and coding, entertained the symposium with games called "dots and boxes" (Joel Moses, PhD '67, dean of the School of Engineering, quickly figured out the winning system) and "domineering" (Berlekamp had the whole room mystified). He made his start in the field, he said, with VI-A jobs in circuitry and logic at Bell Telephone Laboratories, where he honed his skills for five more years before taking a faculty post at the University of California in Berkeley. Now he is a consultant in the field and the author of a best-selling, two-volume book of computer games called *Winning Ways* (Academic Press).

Many veterans of the program leave comments in their files when they have completed their degrees: "The 'real-world exposure' shows you a different side of things that you can't experience at school." ... "One of the best parts of going to MIT." ... "The experience is infinitely valuable." ... "VI-A makes MIT one of the best undergraduate programs in the nation."

John Bowker recently retired from the David Sarnoff Research Center in Princeton, N.J., where he was the company's VI-A coordinator for nearly 20 years. Bowker says he "reflects with pride on the successes of many of the students we brought to Princeton." Robert M. Zieve, VI-A coordinator at Bull HN Information Systems in Billerica, Mass., says he is "always impressed with the high calibre of contributions the students were able to make."

Professor Amar G. Bose, '51, did his own VI-A work at Philco Corp. Now he works with VI-A students as a member of the faculty in Cambridge and is chairman of the corporation he founded, so he can look at the program from all three perspectives. VI-A is a "great opportunity," Bose told the symposium. There is "a huge difference between VI-A and VI students: the former have absorbed more from all their MIT work because VI-A gives them more motivation."—John Mattill □

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California Institute of Technology's 55th Annual Seminar Day held last May. The award is the highest Caltech confers on its alumni. Wrighton received a PhD at Caltech in 1972 and joined the MIT faculty that same year.

The Association of Alumni and Alumnae has been notified that **Harland H. Young, Jr., PhD '32**, of Columbus, Ohio, died on December 31, 1991. No further information was provided.

VI ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

David L. Potter, SM '88, writes: "I am working as a marketing manager for Data Acquisition Products for National Instruments in Austin, Tex."... From Pittsburgh, Pa., **Reid Simmons, SM '83**, PhD '88, reports: "In November 1991, Pearl and I had our



L.M. Magid

second child, a girl named Rachel."... **Leonard Magid, PhD '62**, has joined Walsh-Lowe & Associates, Inc., of Hoboken, N.J., as group VP for development. The firm specializes in the strategic and tactical planning, needs assessment, design and implementation of voice, data, video, and satellite communications systems and service. Walsh-Lowe has provided communications support for several New York area firms, including Merrill Lynch, Shearson-Lehman, and Prudential.... **Shmuel Winograd, '58**, SM '59, has been elected to the Council of the American Philosophical Society. The APS, the country's oldest learned society, was founded by Benjamin Franklin and friends. It promotes excellence and useful knowledge in the sciences and humanities through scholarly research, professional meetings, publications, library resources, and community service.

The IEEE has honored three Course VI alumni at a ceremony held in Boston last May. **G. David**



G.D. Forney, Jr.

Forney, Jr., SM '63, ScD '65, a VP of Motorola, Inc., was awarded the IEEE Edison Medal for original contributions to coding, modulation, data communications modems, and for industrial and research leadership in communications. Forney has devised data communications systems for applications ranging from interplanetary space probes to telephone-line modems. In a career that has thus far spanned three decades, Forney designed the first commercially successful high-speed telephone-line data modem, later made an international standard. **Amos E. Joel, Jr., '40**, SM '42, a leader since 1948 in the development of electronic switching systems, has been awarded the IEEE Medal of Honor for fundamental contributions to and leadership in telecommunications. The medal is considered to be the highest honor the IEEE can confer. "A telecommunications inventor, educator, and research scientist, Joel holds 70 patents for telecommunications products, including the first automatic telephone billing equipment, the first modern operator system, and the cellular mobile radio. He taught the first course on switching systems and circuit design, and designed some of the earliest digital computers and cryptanalysis machines during WWII. In addition he has played a major role in establishing the concepts of electronic switching

now used throughout the world," states an IEEE news release. Joel, who worked for AT&T Bell Laboratories until 1983, is now a consultant. **C. Gordon Bell, '57**, SM '57, designer of more than 50 computer systems, was awarded the John Von Neumann Medal for innovative contributions to computer architecture and design from the IEEE. Bell's accomplishments include design of the first minicomputers and timesharing computers at Digital Equipment Corp. In 1972, as DEC VP for R&D, he led development of the company's VAX minicomputers and VAX Computing Environment. Other achievements include start-ups at Encore Computer Co., where he was responsible for one of the first multiple microprocessors, and at Ardent Computer, where he built the first graphics supercomputer. Bell is currently a consultant-at-large.

William B. Lenoir, '61, SM '62, PhD '65, has rejoined Booz-Allen & Hamilton, Inc., the international management and technology consulting firm, as a VP. In his new position, Lenoir will manage the company's Applied Systems Division, which provides services and develops systems in the areas of transportation, engineering productivity, and software integration. He will also develop the firm's business in transportation distribution consulting. Lenoir was with Booz-Allen from 1984-89, when he led the firm's space business. He returns after three years as associate administrator for space flight with NASA.

Brian R. Stanley, SM '75, was appointed staff physician in Eastern Michigan University Health Services. A former computer systems analyst, Stanley worked for the U.S. Indian Health Service from 1982 to 1991 and operated an outpatient practice at Albuquerque Indian Hospital in 1990-91. His work with the IHS included director of professional services in 1989-90, director of the Division of Information Resource Management in Phoenix, Ariz., from 1984 to 1989, and staff physician/clinical director at Parker Indian Hospital in Parker, Ariz., from 1982 to 1984.

Robert G. Gallager, SM '57, ScD '60, the Fujitsu Professor of Electrical Engineering and codirector of the Laboratory for Information and Decision Systems at MIT, has been elected to the National Academy of Sciences in recognition of his "distinguished and continuing achievements in original research." Eight MIT faculty members were elected this year, bringing to 96 the number of living NAS members from MIT.... The second edition of *Algorithms: The Spirit of Computing* (Addison-Wesley, 1992), by **David Harel, PhD '78**, has just been published. "This innovative revision of the best-selling first edition presents the most important concepts, methods, and results that are fundamental to the science of computing," states the book jacket. Harel is a professor and chair of the Applied Mathematics and Computer Science Department at The Weizmann Institute of Science, and he is one of the founders of Ad-Cad, Inc.

Earle P. Blanchard, EE '49, of Cocoa Beach, Fla., died on April 10, 1992. He was a retired electrical engineer who had worked at Draper Lab.... The Association of Alumni and Alumnae has been notified that **Robert R. Moats, SM '46**, ScD '50, of Mount Prospect, Ill., died in 1991. No further information was provided.

VI-A INTERNSHIP PROGRAM

The celebration of VI-A's 75th anniversary, last June, took place without a hitch and, although I said I'd report on it in this issue, that will be delayed by the deadline for this article and the fact that *Technology Review's* editor emeritus, John I. Mattill, has been commissioned to report on the celebration. Suffice it to say, the Grier Room Memorabilia Exhibit was a hit; many acquaintances were renewed at the Friday evening reception; the Saturday morning symposium was well received; and the gala Saturday evening banquet at the MIT Museum was a wonderful conclusion.

The final figure for this year's new VI-A class has

firmed up at 81, reports Director Kevin O'Toole, SM '57, NE '57 (XIII). Four new company additions to the program this year, include GM's Delco Electronics in Kokomo, Ind.; Hughes in Los Angeles; Intel Corp. in Folsom, Calif.; and Jet Propulsion Laboratory in Pasadena, Calif.

VI-A is honored by having another one of its alumni elected to the MIT Corporation. At its June 1st meeting, just prior to Commencement, William B. Lenoir, '61, SM '62, PhD '65, was elected a member, according to Chair Paul Gray, '54, SM '65, ScD '60. Bill, who was the Association of Alumni and Alumnae nominee, is a VP of Booz, Allen & Hamilton, Inc., and was NASA's associate administrator for space flight. I have in my office a signed photo from Bill of the launch of Shuttle Columbia in which he flew in November 1982 and which was presented to me when he came to MIT to speak under the sponsorship of the Tau Beta Pi Chapter. It was on display for our 75th Anniversary Celebration.

Honor and awards are announced at the end of the spring term and VI-A students continue to be prominent amongst the winners. Of the 45 elected to Phi Beta Kappa, six were VI-A's: Mohsinuddin Ansari, '92, Harold Y. Hwang, Anthony C. Kam, Hong-Kwang Jeff Kuo, '91 (XVIII), '92 (VIII), '92, SM '92, Robert J. Lustberg, and Gregory K. Toth, '91, SM '92.

Of the 133 seniors from the School of Engineering elected to Tau Beta Pi, the National Engineering Honor Society, 35 were VI-A students. Eta Kappa Nu, the Course VI honorary, elected 121 members of whom 53 were VI-A's.

The Department's annual Awards Social was held on May 17 at the Boston Museum of Science. Twenty-two students won prizes, of which seven were VI-A students. Of the named Teaching Awards: Salman Akhtar, '92, SM '92, received a Frederick C. Hennie III Award; John R. Buck, '89 (XXI), '89, SM '91, EE '92, was promoted to Instructor-G; one of two receiving the Northern Telecom/Bell-Northern Research, Inc., Award for the best 6.111 Project was Derek R. Curd; three others, Christopher A. Cooke, Todd E. Knibbe, and Karl Sun, received the George C. Newton Undergraduate Laboratory Prize for their project "Smart Vision;" and a George M. Sprowls Scholarship Fund Award went to Katherine A. Yelick, '82, SM '85, PhD '91, for her PhD thesis.

Straight "T" Athletic Awards are the highest awards given for athletic performance and were given out at the Institute's May Awards Convocation. One was earned by VI-A swimmer Jim Bandy.

Finally, Office of Minority Education awards for achievements in academic and extra-curricular activities went to 76 students, seven of whom were enrolled in the VI-A Internship Program.

There are some alumni who've contacted us or visited the VI-A Office, since our last writing: Jeffrey M. Blacksin, '82, SM '83, who's now with Hewlett-Packard Medical, stopped by for a chat. . . Eric W. Burger, '84, who now lives in McLean, Va., sent me an announcement of the birth of his second child. . . Russell C. Coile, '38, SM '39, EE '50, of Pacific Grove, Calif., came by with his wife several days before the VI-A 75th celebration and had a nice reunion with me (he had attended the West Coast picnics I used to run back in the '80s). . . William A. Freeman, '72, stopped by to visit. . . Anthony F. Gabrielle, Jr., '49, SM '50, SM '61 (XV), VP for Computer Applications at Gulf State Utilities, called for information about VI-A administration, as he expects to head up co-op education at Lamar University in Beaumont, Tex. We had a great chat as he and I were national officers together in the Eta Kappa Nu Association years ago.

We had a visit from Michael A. Lieberman, '62, SM '62, PhD '66, who is a professor in EECS at the University of California at Berkeley. . . And a reunion with Joel Schindall, '63, SM '64, PhD '67, who is president of Loral Conic in San Diego, Calif., as he came via Boston to visit his sister on his way to a meeting in New York City.—John A. Tucker, director (emeritus), VI-A Internship Program, MIT, Room 38-473, Cambridge, MA 02139.

VII BIOLOGY

Iris C. Anderson, SM '67, writes: "I have moved all my research activities to the Virginia Institute of Marine Sciences College of William and Mary, where I am studying nitrogen cycling processes primarily in salt marshes but also in areas subject to anthropogenic disturbances such as the burned savannas of Brazil." . . . Two MIT faculty members in biology and a Whitehead Institute Fellow are among 17 researchers nationally selected as 1992 Searle Scholars. Each will receive a grant of \$180,000 over the next three years for research support. The recipients are Chris Kaiser, PhD '88, and Haxel Sive both assistant professors, and Alan Sachs. Sive is also an associate member at Whitehead. The Searle program supports "individuals who have already done innovative research and who have given evidence of having the potential to make significant contributions to biological research of an extended period of time." Kaiser's project is "Molecular Genetics of Organelle Assembly." Sive is working on the "Formation of the Anteroposterior Axis During Vertebrate Embryogenesis," and Sachs will soon take his project on "The Poly(A) Tail and Post-transcriptional Regulation" to the University of California at Berkeley." . . . Alex Rich, the William Thompson Sedgwick Professor of Biology at MIT, has published a chapter in *The Chemical Bond: Structure and Dynamics* (Academic Press, 1992), edited by Ahmed Zewail.

VIII PHYSICS

From Rancho Palos Verdes, Calif., Andrei Szilagy, PhD '84, reports: "I have been enjoying my work in new display technologies at Aura Systems' Electro-Optics Division, where I serve as chief scientist. Since May 12, 1992, my life has sprouted an entirely new dimension with the birth of our daughter, Ariel Szilagy." . . . The Council for International Exchange of Scholars in Washington, D.C., has announced that Philip C. Clapp, PhD '63, professor of metallurgy and director of the Center for Materials Simulation in the Institute of Materials Science at the University of Connecticut at Storrs, has been chosen to receive a Senior Fulbright Research Scholarship for the 1992-93 academic year. The award was



P.C. Clapp

offered by the Council in all research fields spanning the humanities and sciences for work in France for that year, and will provide approximately \$30,000 for support and travel expenses. Clapp plans to use the scholarship during his sabbatical year to collaborate with the research group of Georges Martin at the Centre d'Etudes et de Recherches sur les Materiaux (CEREM), Saclay on the computer modeling of phase transformations and fracture properties of materials. Prior to arriving in France, he planned to give a series of 10 half-day lectures on phase transformations and computer modeling in metals at the Institute of Metals Research in Shenyang, China.

Max J. Keck, '61, has been named the new dean of the College of Arts and Sciences at Xavier University in Cincinnati, Ohio. Keck left Rockhurst College in Kansas City to join Xavier. . . Institute Professor Jerome I. Friedman and Professor Henry W. Kendall, PhD '55, Course VIII faculty members, who shared the Nobel Prize for Physics in 1990, have been elected to the National Academy of

Engineering in recognition of their "distinguished and continuing achievements in original research." They were two of eight MIT professors elected this year. . . Institute Professor John D.C. Little, '48, PhD '55, received a 1992 Paul D. Converse Award at a Marketing Symposium. These awards were established in 1946 by the American Marketing Association for persons who have made outstanding contributions to the science of marketing. Little's award was for his article, "Models and Managers: The Concept of a Decision Calculus," published in *Management Science* in April 1970.

The Association of Alumni and Alumnae has been notified of the following deaths: Edward A. Coomes, ScD '38, of South Bend, Ind., on March 7, 1992; David T. Keating, SM '50, PhD '53, of Coronado, Calif., on July 19, 1991; and Leo P. Tarasov, ScD '37, of Framingham, Mass., in 1991. No further information was provided.

X CHEMICAL ENGINEERING

John H. Lutz, ScD '43, writes: "Lillian and I are still enjoying two of the most beautiful spots on earth—the Maine Coast in summer and the U.S. Virgin Islands in winter!" . . . J.M. Roblin, SM '55, sends word: "I'm serving as director of Engineering Research & Industrial Liaison at the University of North Carolina at Charlotte. Although small compared to MIT, UNCC's engineering research has had a compound annual growth rate of over 80% for the last eight-year period. Research is in microelectronics, optoelectronics, precision engineering, computer-integrated manufacturing, transportation, environmental and bio technologies, including biomedical." . . . Michael Lysaght, '64 (XXI), SM '66, VP for R&D at Cellular Transplants, Inc., in Providence, R.I., has been named a fellow in the College of Fellows of the American Institute of Medical and Biological Engineering (AIMBE). Lysaght is also an adjunct associate professor of biomaterials at Brown University. AIMBE itself promotes coordination among biomedical science researchers and seeks to enhance public awareness of biological and medical engineering. The organization's College of Fellows is made up of professionals who represent various constituencies of the medical and biomedical and engineering community. Prior to becoming a faculty member at Brown in 1990, Lysaght was director of the artificial organs research laboratory at the University Hospital of Munich, Germany. He has written extensively on the subjects of membrane transport hemodialysis, hemofiltration, apheresis, artificial organs, and biomedical engineering.

The 1992 Clemson Award for Applied Research has been presented to Ioannis V. Yannas, SM '59, of the Department of Mechanical Engineering, internationally known for his work in the development of artificial skin. He was cited for "the development of analogs of extracellular matrix based on composites of collagen and glycosaminoglycans to facilitate the regeneration of tissue, in particular skin and nerve." The Clemson Awards, first given in 1973, are presented to those "who have made outstanding contributions to basic research, research applied to the clinical field, and contributions to the literature in the area of biomaterials." . . . Robert S. Langer, ScD '74, the Germeshausen Professor of Chemical and Biomedical Engineering, has been elected to the National Academy of Engineering. He was one of eight MIT faculty members so honored this year.

A. Gregory Jameson, SM '40, of New York City, died on March 26, 1992. Jameson had been a professor emeritus of clinical medicine at the College of Physicians and Surgeons at Columbia University, and former director of cardiology at Roosevelt Hospital. Jameson was known for his work on cardiac catheterization, the insertion of a fine tube into the heart via a blood vessel to investigate its condition. In the course of his career, he wrote extensively on cardiovascular disease. During WWII, in his work for the government on various military

projects, he contracted asbestosis, a lung condition that results from inhaling asbestos fibers, which led to his death. He was a past member of the Director's Council of the New York Heart Association and a trustee of the New York Academy of Medicine. . . . **Charles J. Sheehan**, SM '67, of Andover, Mass., died on May 12, 1992. Sheehan was a chemical engineer and worked in the leather tanning business throughout his career, and was a former president of Riley Leather in Woburn, Mass. He was a member of the American Institute of Chemical Engineers and the New England Tanners Association. . . . The Association of Alumni and Alumnae has been notified that **Gerard J. Griesmer**, SM '52, of Vienna, Austria, died on May 29, 1990. The following alumni died in 1991: **Herman C. Phillips**, SM '32, of Stone Harbor, N.J.; **William H. Humphreys**, SM '33, of Houston, Tex.; **Henry A. Dick**, SM '49, of Atlanta, Ga.; and **Guy M. Pound**, SM '44, of Crescent City, Calif. No further information was provided.

XI URBAN STUDIES AND PLANNING

From Seattle, Wash., **Krag Unsoeld**, MCP '89, writes: "I am employed as an environmental planner by the Puget Sound Water Quality Authority, a state agency that has developed a comprehensive water quality management plan for the Puget Sound Basin. We are responsible for coordinating the implementation of this plan by federal and state agencies, and local and tribal governments. The Puget Sound plan was the first regional plan to be approved by the EPA under the federal National Estuary Program. Louise Kaplan and I have a son, Kai Kaplan-Unsoeld, born November 13, 1991." . . . **George Leung**, MCP '77, managing director at Moody's Investors Service and chair of the State Rating Committee in New York City, was recently profiled in *CAMITalk*, the publication of Chinese alumni at MIT. The short feature reports that Leung "made headlines in the *New York Times* when he and his colleagues at Moody's recommended the downgrading of New York State's bond rating from A to Baa1 on January 7, 1992. Since then, he has appeared on ABC's *Nightline* where he spoke with Governor Mario Cuomo about New York State's declining financial condition, and has been interviewed on national radio."

XII EARTH, ATMOSPHERIC, AND PLANETARY SCIENCES

R. Grant Ingram, PhD '71, writes: "I am currently professor of physical oceanography in the Department of Atmospheric and Oceanic Sciences at McGill University. I recently was appointed as commissioner for the Federal Environmental Review of the Great Whale River Hydroelectric Project." . . . **A. Nelson Dingle**, SM '45 (XIV), ScD '47, reports that he is retired. He is



E.P. Laine

bowling and golfing in season. Growing Christmas trees is also one of his pastimes. . . . **Edward P. Laine**, PhD '77, director of the Environmental Studies Program, has been promoted to associate professor with tenure at Bowdoin College in Brunswick, Maine. Prior to his appointment, he was assistant professor of geology. Laine, whose areas of interest include marine geotechnology and environmental studies, joined the Bowdoin faculty in 1985.

The Association of Alumni and Alumnae has been notified of the following deaths: **Paul J. Roebber**, SM '83, of Montreal, Canada, in 1991; **Thomas H. Leith**, '53, of Toronto, Ontario, in July 1990; and

Bernard Zavos, SM '53, of Rockville, Md., on December 8, 1990.

XIII OCEAN ENGINEERING

Jennifer Zeien, SM '80, writes: "I received a JD from the National Law Center of George Washington University last May, and began my clerkship in the United States Claims Court in August." . . . Commander **Richard D. Hepburn**, (USN), SM '88, NE '88, reports: "I am the resident supervisor of shipbuilding in Savannah, Georgia. I'm responsible for construction of lead and follow on ships of the Coastal Minehunter Class for the U.S. Navy. The MHC-51 is the largest glass reinforced plastic ship ever built at 900 tons and 187 feet long."

Captain **Allan L. Dunning**, SM '32, (USN ret.), of Stonington, Conn., died on April 22, 1992. During his 28 years in the Navy, Dunning held top posts in several naval shipyards. While superintendent at the Philadelphia Naval Shipyard from 1941-45, he supervised the building of the 58,000-ton battleship *New Jersey* which was launched on December 7, 1942, exactly one year after the Japanese attacked Pearl Harbor. He supervised the building of two other huge battlewagons, the *Washington* and the *Wisconsin*, two aircraft carriers, and 45 other ships. In addition to Philadelphia, Dunning held posts at shipyards in Boston, New York, and Charleston, S.C. He also served in the Asiatic Fleet, the Occupation of Japan, and at the Naval Bureau in Washington, D.C. He retired from the Navy in 1955 to take a position as assistant general manager at Electric Boat in Groton, Conn. Ten years later he left that company and was named executive director for the International Executive Corps in Indonesia. During his four years in Indonesia, he developed more than 100 projects where volunteer executives, most retired from U.S. business and industry, helped Indonesian companies. Dunning was also active in civic affairs.

XIV ECONOMICS

Howard F. Chang, SM '88, writes: "I have written an article with Professor Lucian Bebchuk of Harvard Law School, 'Bargaining and the Division of Value in Corporate Reorganization,' published in the *Journal of Law, Economics, and Organization* (April 1992). I received a PhD in economics from MIT this past summer, and accepted an appointment as assistant professor of law at the University of Southern California Law Center in Los Angeles." . . . **A. Nelson Dingle**, SM '45, ScD '47 (XII), reports that he is retired. He is bowling and golfing in season. Growing Christmas trees is also one of his pastimes. . . . **Alberto Giovannini**, PhD '84, associate professor at the Graduate School of Business at Columbia University, discussed "Europe in 1992 and Its Implications for the U.S. Economy," as part of the Global Awareness Lecture Series at King's College last spring. Giovannini is also a consultant to the International Monetary Fund of the World Bank, a member of the Italian Ministry of the Treasury, and a member of the editorial board of *The World Bank Economic Review*. He is currently working on a graduate monograph on international financial markets to be published by Basil Blackwell. . . . **James A. Kahn**, PhD '86, assistant professor of economics at the University of Rochester, has received a research fellowship from the Alfred P. Sloan Foundation. Kahn studies inventory behavior and financial market imperfections. His research on inventories focuses on understanding why inventory investment plays a significant role in business cycles, and the ways in which companies strike a balance between holding inventories and back orders. He also studies financial market imperfections, for instance, the incomplete information available to banks when they approve and monitor borrowers. With only sketchy

borrower profiles to work from, banks can never know for sure if a borrower will pay back the loaned money. Kahn, who joined the faculty in 1986, will receive \$30,000 over the next two years. The Association of Alumni and Alumnae has been notified that **Mark E. Schaefer**, PhD '77, of Atlanta, Ga., died on April 13, 1992. No further information was provided.

XV MANAGEMENT

Arleen Gilliam, SM '76, director of Budget Planning and Personnel Policy for the AFL-CIO in Washington, D. C., writes: "I was appointed by the Fairfax County Board of Supervisors to a four-year term as a board member of the Fairfax County Park Authority." . . . **Ellen M. Bard**, SM '80, sends word: "As an Abington [Pa.] Township Commissioner, I continue to pursue an 'Act locally, think globally' agenda. Anyone having access to model environmental ordinances, please let me know!" . . . **Harvey D. Jones, Jr.**, SM '83, reports: "In October 1991 I was promoted to lieutenant colonel in the U.S. Army. I am currently assigned to U.S. Army Strategic Defense Command in Huntsville, Ala." . . .

Richard L. Fischer, SM '84, writes: "I am business manager for the GEM (Gammas, Electrons, Muons) Detector project of the Superconducting Supercollider Laboratory. I was promoted in January 1992." . . . From Belmont, Calif., **Gus Pinto**, SM '87, sends word: "I am now VP for marketing at Peak Systems. Julie and our daughter are doing great—and a second child is on the way!" . . . **Mark Proft**, SM '88, reports: "Following the birth of our daughter, Bailey Zaun, on November 17, 1990, my wife and I have been living in Paris while I work as deputy general manager of Scherbinka Otis Lift's new venture in Moscow. We plan to move to Moscow permanently later in 1992." . . . **Lance B. Roulic**, SM '88, sends word: "In June 1991 Terry and I had a baby daughter. We moved to Moscow in October 1991 for a three-year assignment." Roulic is a senior marketing manager for Polaroid. . . . Last May, **Kenneth Schiciano**, SM '89, an associate at TA Associates in Boston, wrote to tell us he was engaged to be married to Pixley Lewis. . . . From Japan, **Tetsu Yamada**, SM '89, reports: "In September 1991 I started working as an assistant manager in the Corporate Finance Department at the Bank of Tokyo's Nagoya office. Toyota Motors is my main account. We had our second son in April 1991."

Andrea Gregoire, SM '90, sends word from Boston: "I am managing the Intimate Apparel Department at Neiman Marcus and managing an entrepreneurial venture on the side. As an independent distributor for NuSkin International, I am having lots of fun distributing fabulous personal care products and recruiting others into my organization." . . . **Antonio Lee**, SM '91, writes: "After returning from an Asian trip, I started work as a brand assistant at Procter & Gamble in Guatemala." . . . **Rodolfo Baquerizo**, SM '91, general manager at Inmobiliaria Casa de Campo in Ecuador, reports: "On May 3, Rosanna and I had our second child, Rodolfo III. He weighed 9 lbs. 10 oz. and was 22 inches long." . . . **Amaury L. Prouvost**, SM '89, is a market manager in Paris, France. . . . **Sheryl L. Hill-Tanquist**, SM '79, sends word: "I received an MDiv and an MA in theology and the arts from the Pacific School of Religion last May. In July, I started as the pastor of College United Methodist Church in Philomath, Ore.—a beautiful little town in the foothills of Oregon's coast range. My husband, Marshall, my children, Tamara and Eric, and I are looking forward to small-town life!"

Jill Reich Zimmer, SM '82, reports: "Rich, Allison, and I moved to Maplewood, N.J., last year. Rich started a window film business a few years ago in N.J.—the reason for the move. I have mostly been working as a mother lately. My catering business, Cornucopia, has taken a back seat. On February 14, 1992, we had a son, Scott. He was 7 lbs. 6 oz. and joined big sister Allison, who was almost 4. Life is busy and full as we adjust to an infant again!"

I'd love to hear from fellow Sloan-ites." . . . **Susan Reilly Cerrone**, SM '83, sends word: "After nearly eight years with Deloitte & Touche (Deloitte Haskins & Sells), as the N.E. manager of healthcare systems consulting, I left to spend more time with our two daughters, Catherine, 5, and Alana, 2. I have been independently contracting to hospitals since then, and am working as the acting CEO for the Boston University Medical Center.

Steven L. Pollack, SM '87, reports: "I have a new job as chief investment strategist with Golden Rule Insurance Co. in Indianapolis. My wife and I live in Carmel, Ind., with our two sons, Daniel, 4, and Joel, 1."



E.J. Kernan

Elizabeth J. Kernan, SM '84, president of Calypso Software Corp. in Kirkland, Wash., recently released a retirement-planning software product called "Retire ASAP." The software is designed to help educate consumers about financial planning and investing. Users provide personal financial information and retirement goals to the program and it shows users if they're

saving enough, how Social Security, inflation, and pension plans may affect their future, how much their investments and employment savings plans may be worth by retirement, and the annual savings they will need to meet the income goal. Kernan worked at Applied Expert Systems and the Digital Equipment Corp. before starting Calypso. Several publications including the *New York Times* and *Business Week* have written about the software. According to *Business Week*: "Calypso's weightier 'Retire ASAP' program lets you produce up to 10 what-if scenarios—for instance, how you would fare if Social Security payments grew 3% annually or you quit your job and lost a pension. 'Retire ASAP' suggests that you consider a reverse annuity mortgage, wherein a bank pays you in advance for your home and lets you continue to occupy the house during your lifetime."

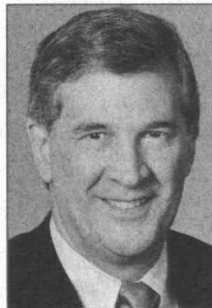
From **Sara M. Smith-Sands**, SM '86, in New York City: "I am proud to report that I started my own business, SMS Benefits Consulting. We offer group and executive benefits planning for small to mid-sized businesses. For individuals, we do personal financial consulting, with an emphasis on insurance and estate planning. On the personal side, David Gelman (my soul mate) and I moved in together after dating two-plus years. All in all, life is very good!" . . . **Patrick Le Feuvre**, SM '80, is director of North American Operations for Compaq Computer Corp. . . . Word from **Bernard Lietner**, SM '69, in Bermuda: "For the last five years, I have been managing currency funds. Until the end of April 1991, I was co-founder, general manager, and currency trader for the most successful currency and off-shore fund (according to *Business Week*, July 25, 1990). I'm now starting my own currency management organization under the name Pegasys." . . . **Brook Spaulding**, SM '91, writes: "I'm working for Champion International Corp. (paper, not t-shirts!) in their Publication Papers Division and loving it. Will be in Bucksport, Maine, for another year learning more about paper-making, then back to Stamford, Conn. Beautiful area—visitors welcome!" . . . **Scott McCan**, SM '88, reports from Westfield, Ind.: "I have one child, Christopher Scott, who is nearly 2 years old. I was promoted to manufacturing engineering supervisor at Delco Electronics in April 1991."

Donella H. Meadows, **Dennis L. Meadows**, PhD '69, and **Jørgen Randers**, PhD '73, have recently published *Beyond The Limits* (Chelsea Green Publishing Co., 1992), a sequel to *The Limits to Growth*. According to its jacket, the new book "helps us confront the possibility of global collapse in order to envision the possibility of a sustainable future. They use World3, their system dynamics computer model, as a unique tool to see far into the next cen-

tury. And by varying the basic global policy assumptions that go into the model, they are able to show a range of outcomes, from collapse to sustainability." Dennis Meadows is director of the Institute for Policy and Social Science Research and professor of systems management at the University of New Hampshire. Randers is a policy analyst and president emeritus of the Norwegian School of Management. He is chair of the Norwegian Bank for Industry, Norwegian Institute for Market Research, and Åke Larson, AS. . . . **Lester Thurow**, dean of the Sloan School of Management, has written *Head to Head: The Coming Economic Battle Among Japan, Europe, and America* (William Morrow & Co., 1992). In his new book, Thurow discusses the three economic superpowers and the emerging economic landscape.

James L. Paddock, PhD '79, of Lincoln, Mass., died of heart failure on April 6, 1992. Paddock, who had been a professor of international business relations at Tufts University's Fletcher School of Law and Diplomacy since 1985, was on sabbatical leave with his family when he was stricken. Paddock was also the director of the Fletcher School's program in international business relations and was the school's academic dean. He was famous in academic circles for his research into international finance, international project investment evaluation and finance, international corporate finance, and the financial aspects of the international energy markets. Before joining Fletcher, Paddock was on the faculty of the Sloan School of Management. He also worked for several corporations, among them Arthur D. Little, Inc. He was a consultant to several corporations and governments on matters of finance and energy. During the 1980s, Paddock worked on two studies for the National Petroleum Council on United States refinery flexibility and Third World petroleum development. He also worked with the technical energy group of the United Nations task force on long-term development objectives. From 1964-71, he was a pilot with the Air National Guard, holding the rank of captain.

Sloan Fellows



E.J. Zemke

been with IBM Corp. for 18 years.

Senior Executives

From Rockville, Md., **Keiichi Tamaki**, '88, writes: "I'm currently working for the World Bank on infrastructure development in Indonesia."

The Association of Alumni and Alumnae has been notified of the following deaths: **William R. Dial**, '67, of Akron, Ohio, on September 15, 1991; **John B. Hibbard**, '66, of Elizabethtown, Pa., in 1991; and **Richard W. Freund**, '63, of New York City, in 1991. No further information was provided.

Management of Technology Program

Mark Krosney, SM '91, is director of business development at Johnson Controls Automotive Systems Group in Detroit.—Fay Wallstrom, Management of Technology Program, MIT, Room E56-304, Cambridge, MA 02139.

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Robin B. Dill, '77
Andrew F. McKown, SM '78
Keith E. Johnson, SM '80
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XVI AERONAUTICS AND ASTRONAUTICS

Ronnie M. LaJoie, SM '87, reports: "In November 1991, I transferred from Boeing in Seattle to Boeing in Huntsville, Ala. This Yankee is now in the Deep South of Dixie working on the Space Station Freedom program in Payload Integration. And I have bought a house!" ... Stuart Kazin, SM '67, was recently profiled in the winter 1992 issue of *The WPI Journal*. The piece on Kazin, "Raising Standards by Raising Awareness," was part of a larger article on manufacturing. The VP for worldwide manufacturing and distribution at Lotus Development Corp., received his undergraduate degree at WPI. ... Jack L. Kerrebrock, the Course XVI Richard Cockburn Maclaurin Professor, has written *Aircraft Engines and Gas Turbines: Second Edition* (MIT Press, 1992). "This updated edition has been substantially revised to include more complete and up-to-date coverage of compressors, turbines, and combustion systems, and to introduce current research directions," states the book jacket.

James S. Cooney, SM '41, of Attleboro, Mass., died on April 1, 1992. In 1954, Cooney founded the Pylon Co., which he operated on a part-time basis until 1960, when he went into the business full-time. He served as president until 1982 when the company became Augat-Pylon and he was named director of R&D. After retiring in 1985, he was a consultant to the Speecon Co. An inventor, he developed many electronic devices and electronic insulators, including the Pogo insulator. During WWII he served in the U.S. Army in the European Theater. He was employed from 1946 to 1960 by the former Metals & Controls Co., now part of Texas Instruments. The Association of Alumni and Alumnae has been notified that William L. Fader, Jr., SM '41, of Pittsburgh, Pa., on December 10, 1991. No further information was provided.

XVII POLITICAL SCIENCE

Joseph L. Klesner, SM '83, PhD '88, writes: "I have been promoted to associate professor of political science at Kenyon College, effective 1 July 1992. I will be on sabbatical during the 1992-93 academic year, studying elections and political parties in Latin America."

From Washington, D.C., Michael C. Ryan, SM '82, PhD '86, sends word: "As senior editor, recently completed publication of the Secretary of Defense *Annual Report to the President and the Congress*, February 1992. Continuing to serve as a military assistant in the Office of the Secretary of Defense. Recently awarded the Defense Meritorious Service Medal, and Joint Service Commendation Medals for publication of *Soviet Military Power* (1990), and *Military Forces in Transition* (1991), as senior editor and project manager."

Hayward R. Alker, Jr., '59 (XVIII), Course XVII professor, has been elected as president of the International Studies Association—the major professional interdisciplinary association in the social sciences for scholars and practitioners focusing on international issues. Alker, who has been at MIT since 1968, assumed the presidency of the organization with 2,800 members from 60 different countries. Its membership is concerned with the development, distribution, and implementation of knowledge concerning international relations. Alker has special responsibility for organizing an international meeting to be held in Alcapulco, Mexico, in March 1993. The meeting is to be held jointly with the Mexican Association for International Studies, with a thematic focus on "The Enterprises of the Americans"; the subject is of special interest to North American and Latin American scholars and practitioners because of the current negotiations between Mexicans, Canadians, Americans, Chileans, and others about the forming of a narrow or broader North American Free Trade Area.

XVIII MATHEMATICS

Brian A. Keller, SM '89, a mathematics doctoral student at Western Michigan University in Kalamazoo, Mich., has been named a WMU Research Fellow and awarded \$10,000 to undertake a year-long research project with his faculty mentor. Keller, who is working with Christian R. Hirsch, professor of mathematics and statistics at WMU, will work on an analysis of calculus students' preferences in seeing mathematics problems represented in graphs, equations, or tables and development of a statistical tool to analyze the preference data. ... Richard B. Melrose, Course XVIII professor, is among 149 artists, scholars, and scientists from the United States and Canada selected to receive a 1992 Guggenheim Fellowship Award from the John Simon Guggenheim Memorial Foundation. Melrose's award was in the area of the analysis and geometry of manifolds with corners. ... George Lusztig and Robert D. MacPherson, both MIT professors of mathematics, have been elected to the National Academy of Sciences. They are two of eight MIT professors elected this year—an unusually large number.

Chiao Lin, professor emeritus and Institute Professor, was among six Caltech graduates to be honored with Distinguished Alumni awards at the California Institute of Technology's 55th Annual Seminar Day. The award is the highest Caltech confers on its alumni. Lin, a member of the MIT faculty since 1947, received a PhD at Caltech in 1944.

XX APPLIED BIOLOGICAL SCIENCES



A.E. Humphrey

Arthur E. Humphrey, SM '60, chemical engineering professor at Lehigh University in Bethlehem, Pa., has been named a Fellow in the American Institute of Medical and Biological Engineering's College of Fellows. Humphrey, the T.L. Diamond Professor of Biochemical Engineering and director of the Center for Molecular Bioscience and Biotechnology, was recognized

for his many contributions to the field of biochemical engineering research and teaching. Humphrey's research areas include monitoring and control of bioreactors and mass transfer in biological systems. He is president of the American Institute of Chemical Engineers. The AIMBE promotes coordination among researchers in various areas of biomedical science and public awareness of both biological and medical engineering.

XXI HUMANITIES

Professor Harriet Ritvo of the Program in Writing and Humanistic Studies and the history faculty has been named the new associate dean of the School of Humanities and Social Sciences. Her responsibilities will include oversight of the Humanities, Arts, and Social Science curriculum and new educational initiatives and projects in the school. She will work closely with the HASS office and with undergraduate and graduate program officers in the school's 10 departments, sections, and programs. She will also be directly involved in all faculty personnel decisions as a member of the School Council. Ritvo is known as a versatile and original scholar of the Victorian period and an

accomplished essayist who has written widely on topics in the humanities and social sciences.

XXII NUCLEAR ENGINEERING

Robert W. Davis, SM '80, NUE '80, writes: "My employer is TRW Space & Technology Group in Redondo Beach, Calif. I am the advanced system manager in LightSat Systems. We are working on the leading edge of satellite technology and space systems, with emphasis on the powerful, miniaturized technologies that enable the vastly increased capabilities of small "LightSats" of the 300-800 lb. class, at low costs for development, fabrication, and costs. This new position is responsible for continued growth (through government programs, TRW investments, and acquisitions) and presence in this new market segment. Lead for \$380M in sales in 1991. Working additional \$740M in sales for 1992."

Mark Melvin, a Course XXII graduate student from 1984-86, died June 3, 1992 from complications resulting from AIDS. Melvin received a BS from the University of Michigan in 1984. He was active in the American Nuclear Society Student Chapter, serving as its social chair in 1985. He came to MIT from Bloomfield Hills, Mich., and his research focused on fusion reactor design studies.

XXIV LINGUISTICS AND PHILOSOPHY

John J. McCarthy, PhD '79, a University of Massachusetts professor in the Department of Linguistics, has received a Guggenheim Fellowship. He is the director of the Linguistics Department Graduate Program. He will be using his grant money to complete research in theoretical linguistics and finish a book. The book,

cowritten with Allan Prince, a linguistics professor at Rutgers University, concerns the processes of word formation in relation to sound structure. McCarthy will spend this academic year on sabbatical.

TPP TECHNOLOGY AND POLICY PROGRAM

Kent W. Hughes, SM '85, has informed us that his home and all its possessions were destroyed in the October 20, 1991, firestorm in the Oakland/Beverly Hills area (his father's home was also destroyed). They are rebuilding and would love to hear from other TPP alums. . . . **Steven C. Anderson**, SM '87, will be back in the Cambridge area beginning in September. He will be pursuing a PhD at the JFK School of Government at Harvard University. . . . **Jessica Stern**, SM '88, received a PhD in public policy from Harvard in last June's commencement. . . . **Dava Newman**, SM '89, SM '89 (XVI), PhD '92 (XVI), has been elected to the MIT Corporation as one of the "representatives from recent classes." Congratulations! Dava is the second TPP alum to receive this honor and recognition in leadership in technology and policy, in the past few years, joining **Robin Wagner**, SM '86. . . . **Lee Newman**, SM '92, SM '92 (XV), joined the staff at McKinsey & Co., Inc., in Chicago, Ill., this past September. . . . **Michael "Mick" Rookwood**, SM '92, is an environmental consultant with the Eastern Research Group, Inc.—Richard de Neufville, Technology and Policy Program, MIT, Room E40-252, Cambridge, MA 02139.

STS PROGRAM IN SCIENCE, TECHNOLOGY &

Professor **Deborah Fitzgerald** lectured on sustainable agriculture in the United States in May. Her talk was part of a conference entitled En/Gender-

ing Environmental Thinking, sponsored by the MIT Women's Studies Program. . . . Professors **Loren Graham** and **Kenneth Keniston** have written chapters in *The Outlook for STS*, edited by Sheila Jasonoff and published by the Department of Science and Technology Studies at Cornell University. . . . Professor Emeritus **Carl Kaysen** has initiated a project exploring evolving norms that legitimize international intervention in sovereign states. The project is under the auspices of the American Academy of Arts and Sciences. . . . Professor Emeritus **Leo Marx** spoke at a conference on American Studies in Germany in early June at Bad Munster am Stein, Germany. . . . Professor **Merritt Roe Smith** organized and chaired a session on the European Roots of the American System at the annual meeting of the Society for the History of Technology in Uppsala, Sweden, in August. . . . Professor **Leon Trilling** headed a two-week workshop for 60 middle-school teachers in July. The theme of the workshop, held at MIT, was "How Does a City Work?" . . . Professor **Sherry Turkle** was keynote speaker in May at a Tokyo symposium on advanced robotics. The conference, entitled *Cyberanimism: Will Robots Control Human Beings or Live Together in Harmony in the Year 2019?*, took place at Tokio University.—Phyllis Klein, STS Program, MIT, Room E51-128, Cambridge, MA 02139

Deceased

The following deaths have been reported to the Alumni/ae Association since the *Review* last went to press:

John C. Bradley, '07; May 24, 1992; Waterbury, Conn.

Harold C. Wells, '18; January 26, 1991.

George W. Cann, '19; December 30, 1991; Conestoga, Pa.

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Robert W. Barker, '21; January 21, 1992; Narbeth, Pa.
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 H. Felton Metcalf, '22; May 12, 1992; Newmarket, N.H.
 Charles W. Ufford, '22; April 29, 1992; Newtown, Pa.
 Edwin M. Goldsmith, Jr., '23; May 4, 1991; Wyncote, Pa.
 Herbert L. Hayden, '23; May 2, 1992; Lancaster, Mass.
 Max W. Tetlow, '23; May 14, 1992; New London, N.H.
 Jacob Lurie, '24; April 9, 1992; Denver, Colo.
 John E. Black, '25; February 2, 1992; Clearwater, Fla.
 Homer S. Davis, '25; June 6, 1992; Seattle, Wash.
 F. Cushing Foss, '25; May 7, 1992; Westford, Vt.
 Isaac W. Gleason, '26, SM '27; May 21, 1992; Middlebury, Vt.
 Albert S. Goleman, MAR '25; November 23, 1991; Houston, Tex.
 Naomi C. Turner, '26; May 12, 1992; Arlington, Mass.
 Winfred F. Dunklee, '27; July 25, 1991; Hamden, Conn.
 Arthur Dunlevy, '27; May 1, 1992; North Falmouth, Mass.
 Robert C. Wallace, '27; April 21, 1992; St. Charles, Ill.
 Homer A. Burnell, '28; June 26, 1992; Chicago, Ill.
 Harold L. Geiger, '28; April 18, 1992; Minneapolis, Minn.
 Robert Walker Hunn, Jr., '28, MAR '29; January 1, 1992; Santa Monica, Calif.
 Willis G. McGown, '28; May 6, 1992; Chicopee Falls, Mass.
 James Cooper, '29; May 25, 1992.
 Alfred H. Hayes, '29, SM '30; March 10, 1991; Whiting, Ind.
 Laurence A. Horan, '29; May 8, 1992; North Chatham, Mass.
 Robert E. Jackson, '29; May 3, 1992; Marblehead, Mass.
 Armand M. Morgan, SM '29; April 25, 1992; Portland, Me.
 Edward B. Papenfus, SM '29; June 5, 1992; Vancouver, BC, Canada.
 Leonard C. Peskin, '29, SM '31, ScD '36; July 12, 1991; Wyncote, Pa.

Mark C. Culbreath, '30; April 12, 1992; Raymore, Md.
 Charles D. May, '30; June 13, 1992.
 Lloyd E. Montgomery, '30; April 29, 1991; Colorado Springs, Colo.
 George D. Love, '31; April 28, 1992; Portland, Me.
 Carrington Mason, '31; March 12, 1992; Houston, Tex.
 Robert Sanders, '31; May 31, 1992; Annapolis, Md.
 Howard L. Richardson, '31, SM '32; May 1, 1992; New Britain, Conn.
 Allan L. Dunning, SM '32; April 22, 1992; Stonington, Conn.
 J. Richard Rafter, '32; May 18, 1992.
 Donald C. Sanford, '32; April 28, 1992; Woodbury, Conn.
 Harland H. Young, Jr., PhD '32; December 31, 1991; Columbus, Ohio
 Gardner Harvey, '33; February 23, 1991; Wilmington, Del.
 Frederick A. Ladd, Jr., '33; November 12, 1991; Leesburg, Fla.
 Hugh W. MacDonald, '33; April 29, 1992; Green Brook, N.J.
 Meredith E. Morgan, '33; May 3, 1992; Kerhonkson, N.Y.
 Charles E. Quick, '33; October 26, 1990; Traverse City, Mich.
 Ernst W. Spannhake, '33, SM '35; April 30, 1992; Akron, Ohio
 Robert C. Wellwood, '33; May 15, 1992; Saline, Mich.
 Jack Delmonte, SM '34; April 15, 1992; Glendale, Calif.
 Albert M. Grass, '34; May 29, 1992; Wollaston, Mass.
 Louis T. Montant, Jr., '34; 1992.
 Arthur O. Williams, Jr., '34; May 16, 1992; Doylestown, Pa.
 John L. Fuller, PhD '35; June 8, 1992; Cambridge, Mass.
 Chester H. Brown, Jr., '37; September 22, 1989; Pittsburgh, Pa.
 Rolf E. Schneider, '37; January 24, 1991; Parkersburg, W.V.
 F. William Brown, III, '38; May 15, 1992; Kensington, Calif.
 Richard H. Koehrmann, '38; May 3, 1992; Alton, Ill.
 John J. Perkins, '38; November 15, 1991; New Bern, N.C.
 William S. Quigley, Jr., '39; June 6, 1992; North Scituate, Mass.
 George E.B. Hill, '40; May 7, 1992; Kentfield, Calif.
 Charles S. Butt II, '41; April 16, 1992; McLean, Va.
 Charles Margnetti, '41; June 9, 1986; West Roxbury, Mass.
 John W. Clarke, '42; April 10, 1992; Missouri City, Tex.
 John Hinchman, '42; May 11, 1992; West Cornwall, Conn.
 Bernard Brindis, '43; May 29, 1992; Boca Raton, Fla.
 Tan Chih Lu, SM '44; June 2, 1992; Tustin, Calif.
 Walter J. Loughlin, '46; May 2, 1992.
 James E. Haggett, '47; May 26, 1992; Shrewsbury, Mass.
 Victor H. Pomper, '48, SM '50; May 9, 1992; Weare, N.H.
 Roger D. Smith, '48; March 30, 1992; New Paltz, N.Y.
 James C. Buck, '49, SM '65; August 25, 1990; Coronado, Calif.
 Donald P. Germeraad, '50; May 11, 1992; Underwood, Mass.
 Gerard J. Griesmer, '52; May 29, 1990; Aurora, Colo.
 Howard K. Larson, '52, SM '54; August 5, 1991; Saratoga, Calif.
 George L. Tuer, Jr., ScD '55; March 5, 1991; Aiken, S.C.
 Dorothy O. Schlag, '56; 1992; Redlands, Calif.
 John E. Murray, Jr., '57; 1992; Framingham, Mass.
 Amarjit Singh, '61; July 11, 1991; New Delhi, India.
 George Piotrowski, '64, SM '65; May 24, 1992; Gainseville, Fla.
 Dirk Berghager, '62, SM '64; January 29, 1984; Cascais, Portugal
 William J. Day, '67; May 4, 1992.
 Charles J. Sheehan, SM '67; May 12, 1992; Andover, Mass.
 Kathleen S. Sargent, PhD '71; February 18, 1991; Winchester, Mass.
 Mark E. Schaefer, PhD '77; April 13, 1992; Atlanta, Ga.
 Albert B. Lester, '82; June 7, 1992; Westwood, Mass.
 Paul J. Ramos, '86; May 24, 1992; Seekonk, Mass.

Continued from Page MIT 55

(2)(4) (13)(39 choose 12) / (52 choose 13)

E(doubleton pts) = 4 P(spade doubleton) = (4) (13 choose 2)(39 choose 11) / (52 choose 13)

Combining the above, E(distribution pts) = (19)(29)(31)(37)(239) / [(23)(41)(43)(47)(49)] = ~ 1.61748

So E(pts) = ~ 11.61748

Robert High assumes that the proposer "DANIEL MORGAN is your MAIN GOREN LAD," which just goes to show what happens when you start hanging out with Nob. Yoshigahara.

Better Late Than Never

M/J 1. Darold Rorabacher and George Blondin noticed that numbers ending in one were inadvertently omitted. For example, the fourth n with $F(n,n)=G(n,n)=n$ is "two hundred one." There are 95, not 64 solutions as previously claimed.

SD. I really do not normally include comments on speed problems but quite a ruckus has occurred regarding the minimum number of pitches in a complete baseball game and the number of calls by the first place umpire. I somehow cannot resist printing the following from Tony Carpentieri but will try hard to refrain from speed problem follow-ups in the future.

"I disagree on the number of pitches/plate umpire calls in a complete game. There are things that a pitcher can do, such as (I believe) touching his tongue to his pitching hand that result in one ball being called. So, each half inning goes like this: Pitcher licks hand (or other stuff) 12 times in a row. All calls made by field umpires. He then picks off the three runners, with calls naturally made by field umpires. Well, this goes on for a bunch of half innings, let's say 17. Then a pitcher licks his hand 16 times, and walks a run home in the bottom of any inning after 8. Pitches: 0, plate umpire calls: 0."

In addition, Joseph Gurland tells me that our problem was printed in rec.sport.baseball, a popular electronic newsgroup. Gurland sent copies of several other no-pitch solutions found by newsgroups readers.

Other Responders

Responses have also been received from M. Chellino, S. Feldman, M. Fountain, D. Grant, A. Halberstadt, M. Handel, R. Hedrick, M. Herbert, B. Inadomi, R. Loesch, L. Nissim, A. Ornstein, X. Peng, K. Rosato, J. Rosenthal, G. Schwartz, and A. Wasserman.

Proposer's Solution to Speed Problem

81. Each of the 13 cards has a diamond in the upper left corner and one in the lower right corner, for a total of 26. The Jack, Queen, and King have no other diamonds on them. The Ace through 10 have $1+2+3+4+6+7+8+9+10=55$ additional diamonds.

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Roving Riverward

Since this is the first issue of a new academic year, I once more review the ground rules under which this department is conducted.

In each issue I present three regular problems (the first of which is chess, bridge, go, or computer-related) and one "speed" problem. Readers are invited to submit solutions to the regular problems, and three issues later, one submitted solution is printed for each problem; I also list other readers who responded. For example, solutions to the problems you see below will appear in the February/March issue and this issue contains solutions to the problems posed in May/June. Since I must submit the February/March column in November, you should send your solutions to me during the next few weeks. Late solutions, as well as comments on published solutions, are acknowledged in subsequent issues in the "Other Respondents" section. Major corrections or additions to published solutions are sometimes printed in the "Better Late Than Never" section.

For speed problems the procedure is quite different. Often whimsical, these problems should not be taken too seriously. If the proposer submits a solution with the problem, that solution appears at the end of the same column in which the problem is published. For example, the solution to this issue's speed problem is given below. Only rarely are comments on speed problems published.

There is also an annual problem, published in the January issue of each year; and sometimes I go back into history to republish problems that remained unsolved after their first appearance.

Problems

OCT 1. We begin with a Bridge problem from J. Harmse who notes that the highest possible declarer score is obtained by playing 1NT redoubled vulnerable making all 13 tricks. The problem is to devise a distribution of the cards in which the above occurs with "normal" bidding and play.



SEND PROBLEMS, SOLUTIONS, AND COMMENTS TO ALLAN J. GOTTLIEB, '67, THE COURANT INSTITUTE, NEW YORK UNIVERSITY, 251 MERCER ST., NEW YORK, N.Y. 10012, OR TO: GOTTLIEB@NYU.EDU

OCT 2. The following problem is from Robert Sackheim. A is 73 feet from a straight river, and B is on the same side of the river but not so far from it. M and N are the points on the river nearest to A and B respectively. The length of AB, MN and BN are whole numbers of feet. Joan walks from A to B via the river (i.e., at one point she is at the river), taking the shortest possible route, and this is also a whole number of feet. How far does she walk? What is the direct distance from A to B?

OCT 3. Richard Hess entitles this one "The missing term" and writes: Given the series
...,35,45,60,x,120,180,280,450,744,1260,...
the problem is to find a simple continuous function to generate the series and from it to determine the surprise answer for x.

Speed Department

There are 13 diamond cards in a card deck. How many diamonds are on those 13 cards?

Solutions

M/J 1. We begin with a Bridge problem that Winslow Hartford sent us from the London *Sunday Observer*. In the hand shown, West missed the killing diamond opener against 7H and instead led the spade jack. How can South now make the grand slam?

		North	
		♦ Q 9 5	
		♥ 10 6 5 3	
		♦ A Q	
		♣ J 8 7 2	
West		East	
♦ J 10 8 7		♦ K 6 4 3 2	
♥ 4 2		♥ 9	
♦ 10 9 6 5		♦ K J 9 7 4	
♣ 9 6 4		♣ 5 3	
		South	
		♦ A	
		♥ A K Q J 8 7	
		♦ 3 2	
		♣ A K Q 10	

The following solution is from Jerry Grossman. Win the spade ace, cash five hearts, pitching the diamond from dummy, and play the A, K, Q of clubs. Now with this 4-card ending, lead the last club to the Jack:

		North	
		♦ Q 9	
		♥	
		♦ A	
		♣ J	
West		East	
♦ 10 8		♦ K 6	
♥ K J 6		♥	
♦ 10 9		♦ K J	
♣		♣	

South

♦ 7
♦ 3 2
♣ 10

On the club, West must discard. If he discards a spade, then you can lead the Q of spades off dummy for a ruffing finesse against East's king, pinning West's ten. The ace of diamonds provides the entry back to the board. So assume that West discards a diamond.

Now East is squeezed. If he discards a spade, then ruff a spade and dummy is good. If he discards a diamond, then cash the ace of diamonds, dropping the opponents' remaining cards in that suit, and your hand is good. A neat trump squeeze.

M/J 2. Gordon Rice is thinking of four positive integers $0 < A < B < C < D$ that have a curious property. When numbers are written in base D

$$AB \equiv A \pmod{C}$$

$$BA \equiv B \pmod{C}$$

and For what values of D do solutions exist? Are they unique? Note that AB does not represent $A \times B$. Instead it signifies juxtaposition, e.g., if $A=24$ and $B=345$, AB is 24345.

Robert High writes: Gordon Rice's relationship is far from unique; I found 7,268 solutions with $D < 100$ and 98 with $D < 20$. Since $0 < A < B < C < D$, the conditions boil down to the simultaneous congruences

$$A \cdot D + B \equiv A \pmod{C}$$

$$B \cdot D + A \equiv B \pmod{C}$$

(The fact that A and B are "written in base D" is really irrelevant.)

A little manipulation leads to the conclusion that these conditions are satisfied if and only if we can find $A < B < C < D$ such that

$$(B+A) \cdot D \text{ is divisible by } C$$

and $(B-A) \cdot (D-2)$ is divisible by C

These conditions are satisfied by many families of quadruples; a simple three-parameter family is $C=B+A$; $D=K \cdot C+2$, but there are many other solutions as well, such as (1,7,12,18) or (13,20,21,98).

As noted by Richard Hess, it is easy to see that no solutions exist for $D < 5$, unique solutions exist for $D=5$ and $D=6$, and many solutions exist for every $D > 6$

M/J 3. Daniel Morgan wants to know the expected point count for a randomly dealt Bridge hand of 13 cards? High cards are valued as Ace=4, King=3, Queen=2, and Jack=1. In addition a void (no cards in a suit) contributes 3 points, a singleton contributes 2, and a doubleton contributes 1.

Stephen Janowsky sent a solution involving fairly little calculation (i.e., a computer was not required). He uses the notation E() for expected value, P() for probability and # for "number of" and writes:

The expected high card value of a bridge hand is easily determined using the additivity of expected values:

$$E(\text{ace pts}) = 4E(\# \text{ aces}) = (4/4)E(\# \text{ spade aces}) = (4/4)P(\text{spade ace}) = (4/4)(1/4) = 1. \text{ Thus } E(\text{high card pts}) = 4 + 3 + 2 + 1 = 10.$$

$$E(\text{void pts}) = 3E(\# \text{ voids}) = (3/4)E(\# \text{ spade voids}) = (3/4)P(\text{spade void}) = (3/4)(39 \text{ choose } 13) / (52 \text{ choose } 13)$$

$$E(\text{singleton pts}) = (2/4)P(\text{spade singleton}) =$$

Continued on Page MIT 54

MIT LIFE INCOME FUNDS

MR. GORDON K. LISTER

HOME: Southbury, Connecticut
Green Valley, Arizona

CAREER: Mr. Lister, CH '30, practiced patent law with the New York firm Curtis, Morris & Safford. He retired as a senior partner in 1980.

Mr. Lister's first wife Marion died in 1971 and in 1979 he married a former neighbor, Louise McCarroll. Since retiring he and his wife have shuttled between their summer home in Connecticut and their winter home in Arizona. He served on MIT's Educational Council for 20 years, has been his class secretary since 1960, and was a fundraiser for MIT's Mid-Century Fund. He is a founding life member of the MIT Sustaining Fellows.

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For more information about gifts of capital, write or call Hugh Darden, Frank McGrory or Kevin Larkin at MIT, 77 Massachusetts Avenue, Room 4-234, Cambridge, Massachusetts 02139-4307; (617) 253-3827.

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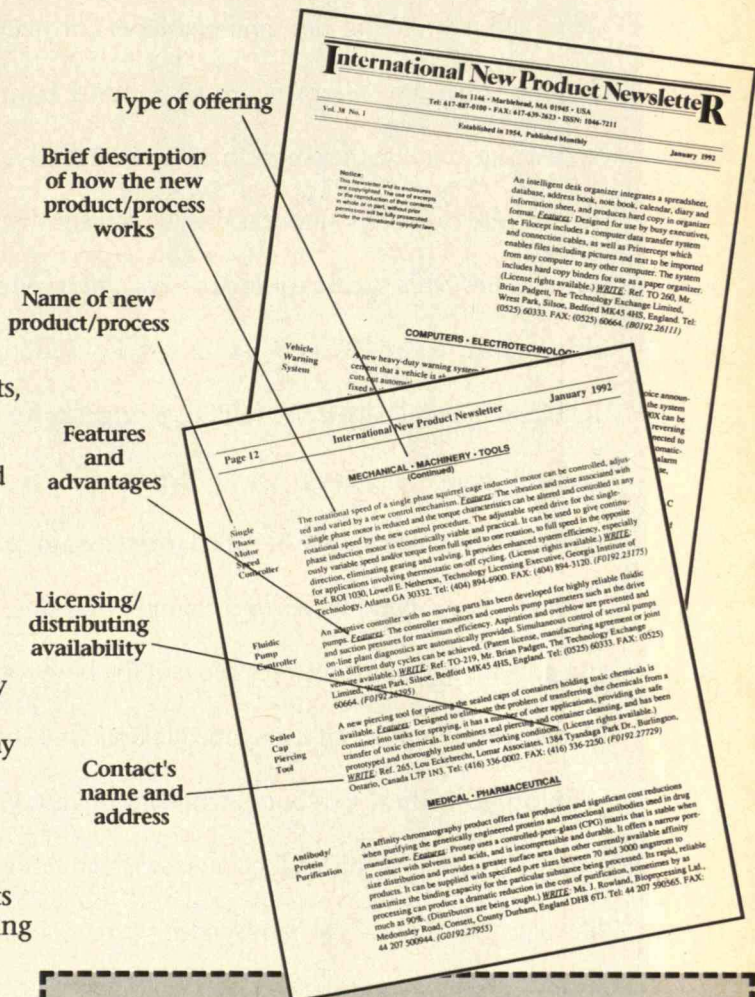
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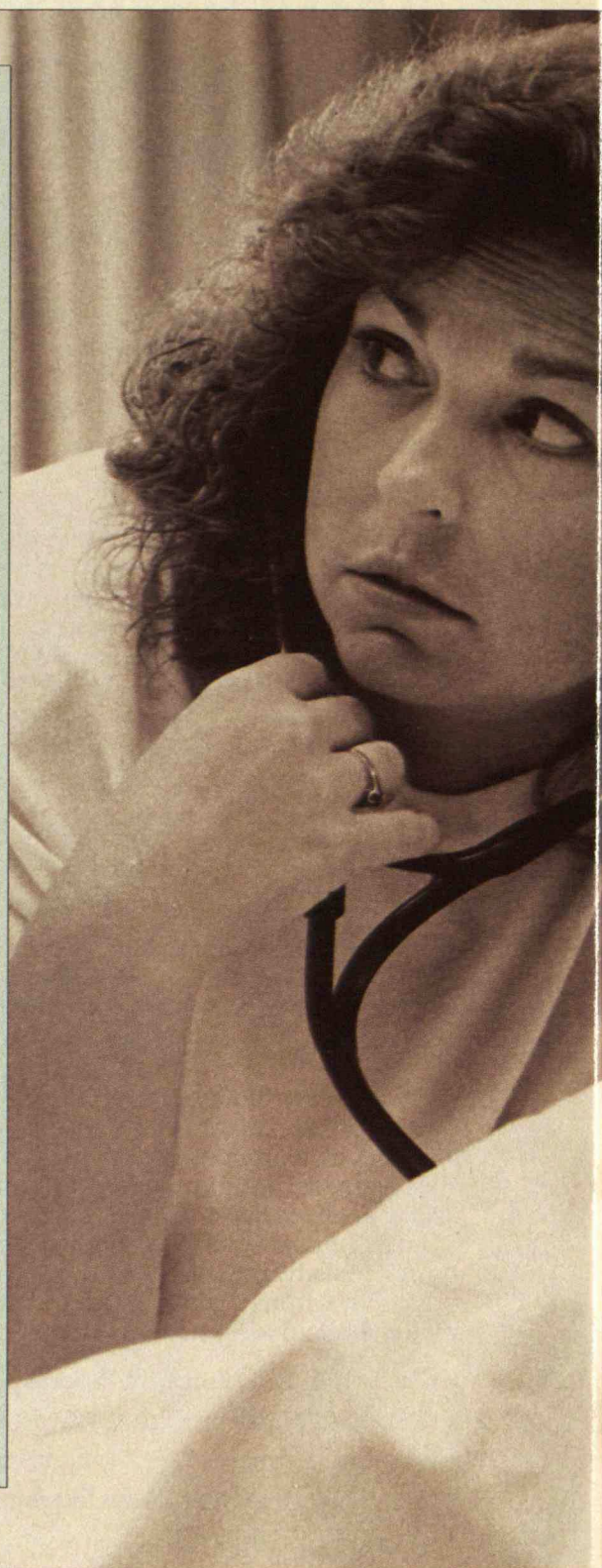
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IN the stillness of late evening, on the surgical intensive care unit of Beth Israel Hospital in Boston, a 60-year-old woman has just emerged from coronary artery bypass surgery. Wires seem to extend from every appendage, binding her most minute instinctual responses to the collection of monitors and video screens that fan out around her bed. Medication from two intravenous (IV) drips controls her blood pressure, level of sedation, and fluid and mineral balance. A ventilator breathes for her.

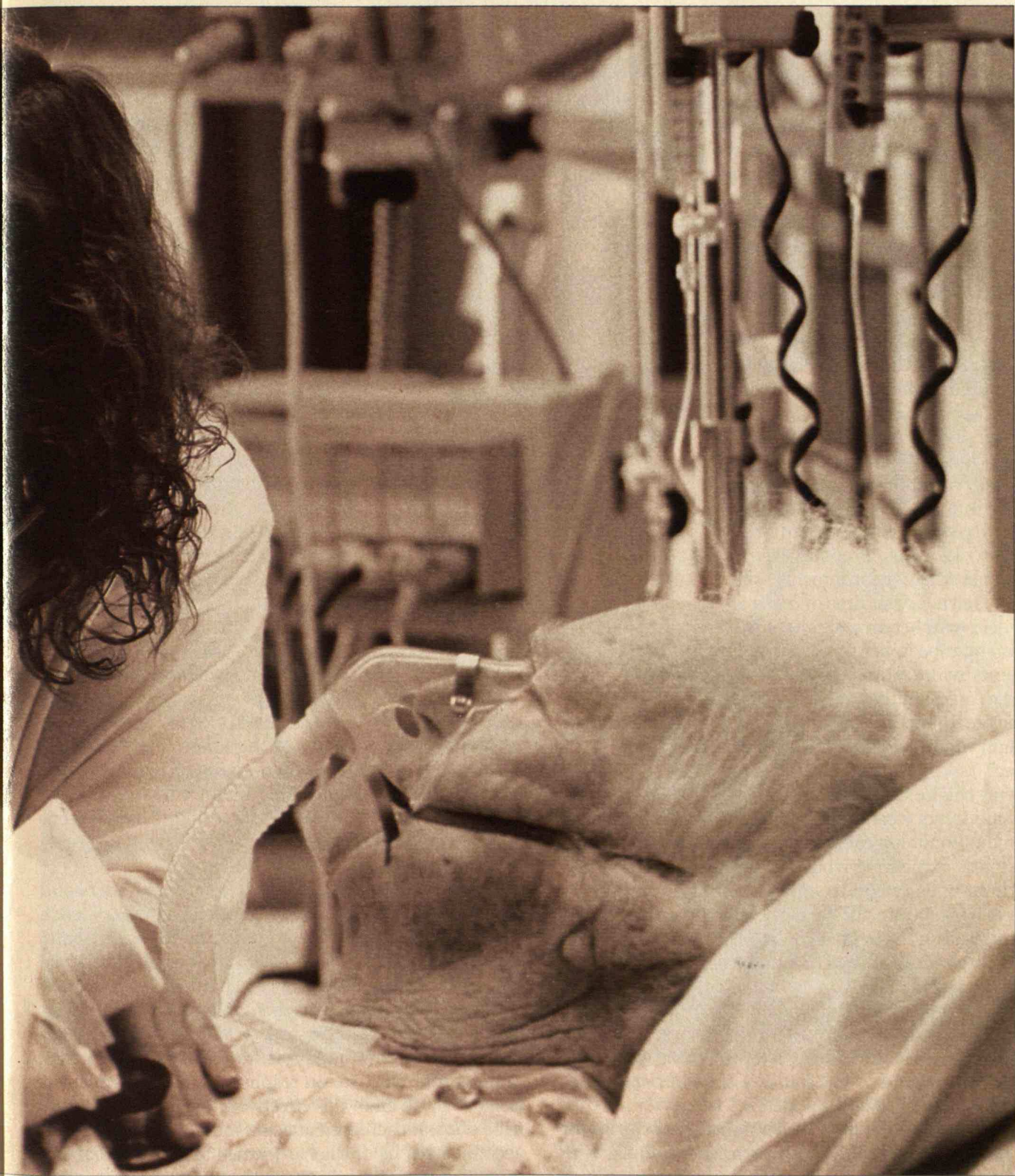
As the patient lingers in her drug-induced sleep, a small, dark-haired woman, Kathleen Clark-Hussain, scans the monitors for second-by-second changes in status. Peering intently at the fluids that enter and exit the body, observing changes in skin tone, adjusting medication, and consulting with other medical personnel who slip in and out of the room, she steers the difficult course on which this woman's life depends. Yet her role in this much written-about procedure is largely invisible to the general public. That's because Clark-Hussain is not a surgeon or a cardiologist but a nurse.

To be more specific, she's the patient's primary nurse,



The Importance

Nursing is more crucial than ever, yet it fails to garner much support—



of Being Nurses

SUZANNE GORDON

largely because of widespread ignorance about what modern health care entails.

responsible for formulating and carrying out a nursing care plan, which, in an intensive care unit (ICU), is complicated. For example, Clark-Hussain points out, "a bypass patient must be restored to normal bodily functioning. But this process cannot be undertaken too quickly. If she warms up too soon, she'll begin to shiver, and that kind of exertion could prove disastrous." Blood and fluid lost during surgery must also be replaced in a way that keeps blood pressure and volume under control—otherwise, congestive heart failure or a rupture of delicate surgical grafts could result. To juggle all these factors, Clark-Hussain manipulates an extensive pharmacopoeia, judiciously adding and subtracting medication in relation to minute-by-minute changes in the patient's responses.

Later, as the patient wakes up, Clark-Hussain begins another critical aspect of her nursing plan: caring for the human being who lodges in the body she's tended during the first 8 to 12 hours after surgery. "I orient her to her environment," she says. "I tell her what time of day it is and deal with her anxiety about the breathing tube in her throat—when patients wake from surgery, they want to talk, but they can't, because of the breathing tube, so you have to explain that they haven't lost their voice."

Over the next 48 hours Clark-Hussain starts weaning her patient from the breathing tube, and while constantly explaining what she's doing, she slowly discontinues medication from the IV drips and begins to deliver it by mouth. "The process of explaining things and reassuring the patient is not a frill," Clark-Hussain states emphatically. "Bypass surgery is a life-threatening procedure, and anxiety can actually create physiological changes that delay recovery."

Finally, Clark-Hussain extends this same attentiveness to the patient's family, keeping them informed about her progress. "The family's anxieties are just as important and great as the patient's," she says.

Most people have little understanding of the major role nurses play in health care, nor are they familiar with contemporary advances in nursing education and research. But spend several hours on a high-tech hospital unit, visit a maternal and child health clinic in a large U.S. city, or talk with nurse researchers who are investi-

gating how to best deliver care to millions of infirm Americans, both young and old, and it soon becomes clear that nurses are not handmaidens passively obeying physicians' orders.

Nursing is, in fact, a different and distinct profession from medicine. "Physicians focus on disease—the manifestation of aberration at the cellular, tissue, or organ level—while nurses focus on illness—the human experience of loss or dysfunction," notes nurse researcher and ethicist Patricia Benner, professor of physiological nursing at the University of California at San Francisco.

Physicians diagnose illnesses and, often with nurses, decide what drugs and therapeutic interventions to administer. But nurses spend far more time with patients than physicians do and inevitably make medical as well as nursing judgments. Moreover, the execution of the all-important details of care is left to the nursing staff. In other words, if one of Clark-Hussain's patients happens to develop a life-threatening condition such as a serious cardiac irregularity, she won't rush to call a physician. "The patient would be dead if she did that," says Joan Lynaugh, professor of nursing at the University of Pennsylvania School of Nursing and director of its Center for the Study of the History of Nursing. "She'll choose a drug from those that she and the physician have agreed upon, and if that intervention doesn't work, she may decide

to administer electric shock treatments."

Nurses also help make sure that patients understand the treatments physicians recommend. "Nurses teach patients how to identify symptoms and the side effects of specific drugs," explains Melanie Dreher, dean of the School of Nursing at the University of Massachusetts at Amherst. "We teach a cardiac or mastectomy patient how to do exercises after surgery. We teach mothers and fathers how to manage technology-dependent children—those who are on respirators, for example—at home." To do all of this effectively, Dreher adds, nurses need to treat each patient as an individual, taking into account what he or she has learned about, say, diabetes or cancer from friends or relatives who may have had such diseases.

Complexity of Care

The complexity of nursing care has always paralleled that of health care in general, and contemporary American health care is nothing if not complex. With 2.1 mil-

Nurses

spend far more time

with patients than

physicians do and

must make medical

as well as nursing

judgments.

SUZANNE GORDON is the author of *Prisoners of Men's Dreams* (Little, Brown, 1991), a study of women in the workplace; and the editor of *Economic Conversion: Revitalizing America's Economy* (Ballinger, 1984).



lion practitioners, nursing is now the largest profession in the field, and it requires rigorous training. For more than 80 years, nursing schools were mainly hospital-based, three-year diploma programs over which nursing faculty had little control, and they produced a low-wage, subservient labor force. But in the past 20 years, most hospital-based nursing schools have closed. While many registered nurses still start out in two-year associate degree programs at community colleges, four-year degree programs are growing, along with master's and doctoral programs. According to the National League

for Nursing, the number of baccalaureate nursing programs has risen from 377 in 1980 to 488 now. In 1970, the nation had only 73 master's and 6 doctoral programs, yet by 1989, the figures were 212 and 47, respectively.

Nursing specialties have also boomed. Today the nation boasts 21,000 certified registered nurse anesthetists and 6,500 nurse midwives, as well as 250,000 to 300,000 nurses who specialize in critical care for patients in high-tech ICUs. One of the fastest-growing areas in nursing education is the three-year master's pro-

grams that produce clinical nurse specialists—nurses with specialties such as lung disease, oncology, cardiology, pediatrics, or geriatrics. Numbering 68,000, these specialists not only care for patients but assist their less specialized nurse colleagues.

Paul Chamberland, a clinical nurse specialist at Boston's Beth Israel Hospital, exemplifies the expertise common in "advanced practice" nursing. When one of his patients, a middle-aged man with serious lung problems, could no longer perform the simplest activities without becoming dangerously short of breath, a physician recommended a permanent alteration—transtracheal oxygen therapy (TTO₂), which delivers oxygen directly to the lungs through a small flexible catheter surgically inserted into the windpipe. Few physicians or other nurses at Beth Israel had had much experience with this new medical technology, but Chamberland had cared for 12 other patients with TTO₂ catheters in another facility.

He met with the patient and his family and carefully explained how the therapy would affect the man's life. He also helped locate a hard-to-find video explaining the device and arranged a meeting with the only other Beth Israel patient who was living with one. Then he met with nurses and physical and respiratory therapists to make sure that they understood how to monitor, maintain, and use the TTO₂. Chamberland has continued to lecture on TTO₂ catheters within the hospital, helping other departments understand and manage the technology.

Nurses put such expertise into practice not only in hospitals but in the community, where they often care for low-income or high-risk individuals. Rather than waiting for women at risk to come to their clinics, for example, the Indiana University School of Nursing has created a Maternity Outreach Mobile. Traveling in a 35-foot mobile clinic, nurses tour Indianapolis neighborhoods to perform ultrasound exams and provide other prenatal and postnatal care.

To treat chronic illnesses, nurses have helped establish programs in hospitals as well as in homes and communities—where 90 percent of AIDS patients, for instance, obtain treatment. Nurses make home visits to administer some of the latest AIDS therapies, such as aerosol pentamidine for pneumocystis pneumonia and interferon treatment for Kaposi's sarcoma. At centers like the Denver Nursing Project in Human Caring—a program that works with the University of Colorado School of Nurs-

ing and five area hospitals—nurses run support groups for HIV patients, give counseling, sponsor educational programs, and work with bereaved friends and relatives.

Kindness Is Not Enough

Nursing leaders are quick to point out that just as physicians rely on scientific research to guide their work, so do nurses. Florence Nightingale, who developed modern nursing and helped reform hospital design and management, was perhaps the first nurse researcher. One of the early pioneers in applying statistical analysis to health care, she wrote in 1859 that "the most important practical lesson that can be given to nurses is to teach them what to observe—how to observe—what symptoms indicate improvement—what the reverse—which are of importance—which are of none If you cannot get the habit of observation one way or other, you had better give up the idea of being a nurse, for it is not your calling, *however kind and anxious you may be.*"

Today every major nursing school and most major hospitals and medical centers conduct nursing research. Moreover, students at most four-year nursing schools take courses in statistics, experimental design, and survey research, says Barbara Jacobson, professor of

nursing research at the University of Pennsylvania. Master's students take advanced courses in research design, while doctoral and postdoctoral students work with nurse researchers on major studies.

The nursing community has designated seven research priorities, notes Ada Sue Hinshaw, director of the National Center for Nursing Research: low-birth-weight infants, HIV care and prevention, management of acute pain, long-term care for the elderly, improved information systems for patient care, health promotion among young people, and technology dependence across the life span. The center awards grants to individual investigators and has funded seven other centers at which researchers collaborate to study a particular area. For example, Ruth McCorkle, a professor at the University of Pennsylvania School of Nursing, has established a center for studying symptom management and quality of life in patients with traumatic illnesses such as cancer.

Assessing quality of life is, in fact, one of the major contributions of nursing research. "Medical researchers tend to use only one measure—survival rates—to evaluate what health professionals are doing," says Kathleen

*Unlike
traditional medical
research, nursing
research aims to
assess the quality
of patients'
lives.*

As an experienced nurse, I am often called upon to assess a person's ability to function. Last year, a woman I'll call "Mrs. A" was denied Social Security disability benefits, and her attorney asked me to review her appeal. When I agreed, I received a file of paperwork that told me almost nothing. Mrs. A was in her early 60s, an immigrant who spoke little English and had found a job in a cafeteria. For several years she had worked diligently, but she had been fired when a new manager refused to let her co-workers assist her with the heavy lifting inherent in the job. The application for benefits, filled out by an intake worker who did not speak Mrs. A's language, stated that she did not fit into the bureaucratic pigeonholes defining disability. Letters from physicians detailing her currently stable medical condition did little to bolster her cause. They said her breast cancer, for which she had undergone surgery, showed no signs of recurrence.

With physicians as the lens and disease as the definition of the field, fragments of a life were examined. The questions asked had little relevance to her ability to function. Would it be possible for me to meet this woman and do a brief nursing assessment? I asked the lawyer.

Two days later, I met Mrs. A and her son, who served as translator. She was small and slim, smiling anxiously as she shook my hand. Her son, a man in his early 30s, was a graduate student at a local college and spoke English



Asking the Right Questions

JEANNIE CHAISSON

well. I explained that I was a nurse, and that my questions might be different than those she had already answered. Addressing me in hesitant English, or in rapid-fire phrases to her son, she talked for over an hour.

I learned that Mrs. A's comfortable, middle-class life had been blown apart by revolution in her native country. One son had been killed, and she had managed to escape with the other. In the United States, her lack of English had disqualified her from the managerial work she had formerly done. And she had been happy to take any job. Only when her pain had become intolerable had she asked her fellow kitchen workers to help her with lifting. They had agreed willingly, but her boss had quickly intervened.

I asked her to tell me about

the pain: How severe was it? Where was it located? What made it worse? What could she do to help make it better?

Mrs. A's pain, which so many others had dismissed, turned out to be a relic of 11 operations for breast cancer that she had undergone before coming to this country. One by one, each new lump and node had been removed, and each time the cancer had reappeared. Terrified to permit the doctors to cut her chest muscles out and "take everything," she had lost both breasts bit by bit. A disfigured body and horrible pain that started in her scarified chest tissue and knifed its way up through her right arm and shoulder was her reward. Nothing could banish this pain—not heat, cold, or medications.

Any activity was difficult.

Moving the right arm, or even moving the hand to write or turn the pages of a book, was excruciating. She couldn't lie on that side at all. She had some pain in her other arm, and sometimes her knees hurt from arthritis, but it was the pain in her right arm and chest that cut her off from life. She said that she didn't blame her boss for firing her. After all, she admitted sadly, she had been able to do less and less of her work.

Mrs. A went on to recount a "typical day," and I saw that the feints and parries of a few years ago, when she had gone to work, to English classes, and to doctors for help, had given way to total defeat. She could achieve an uneasy truce with her pain only by giving up her job, her intellectual pursuits, her relationships with others. As my questions uncovered this tale of overwhelming loss, she became animated, then tearful. "Nobody has ever asked her about these things before," her son explained. "Nobody has cared what it is like for her."

I filed my report, and three weeks later, when Mrs. A's attorney informed me that she had been granted disability benefits, I could only wonder at the "health" of a health care system that had provided regular scrutiny of her body for recurrent disease yet had utterly failed to listen to the story of her illness, to bear witness to her pain. Other health care professionals had talked about her disease; I had asked about her life. ■

JEANNIE CHAISSON, who has a master's in nursing, is a nurse at Beth Israel Hospital in Boston.

Sharing a Father's Grief

DENISE MAGUIRE

AMY was four hours old when we met. She was born 40 miles away from Boston and surprised everyone by arriving a few weeks early. Desperately sick at birth, she simply stopped breathing, and she barely survived until the neonatal transport team arrived to bring her to our unit. The team put her on a respirator, and the staff visited briefly with her mother to explain what was understood about her condition and what could be done for her. She had just arrived on the newborn intensive care unit when I came on duty.

Because Amy was premature, we were not surprised that she needed help breathing. Many premies lack the protein that prevents lung collapse. Such infants usually have initial breathing difficulty that gradually worsens over several days. Because Amy was so sick at birth, we suspected that something more was wrong. A consultation with a specialist confirmed our worst fears: Amy had tracheal agenesis. Her windpipe ended just below her vocal cords, providing no connection to her lungs, and neither medicine nor surgery could do anything to save her life.

Amy's doctor and I called the suburban hospital where her mother was still recovering to tell her what we had dis-

covered. We asked if any family member could travel to Boston. Her mother explained that she had already said her goodbyes to the baby and couldn't handle another painful encounter with her dying daughter. She said that her husband—who was on a fishing boat off the Carolina coast—would like to come and see her before she died, but she worried that extending her fragile baby's life for even a few hours would make her suffer even more. I assured her that Amy was comfortable and was in no danger of imminent death. She could wait to see her father.

It took Amy's father 36 hours to get to Boston. I met him at the door and brought him to meet his beautiful daughter. She looked up at him with tiny sparkling eyes. Her short red hair stood up on end like a caterpillar's. He smiled when she grasped his finger and then sat by her growing more confused and dazed as he watched her lying peacefully. Why did she look so perfect, he won-

dered, if she was so sick? Could nothing be done for her? I asked him to follow me and sat down to draw him a picture of what had gone wrong inside this delicate shell. Amy could not outgrow her condition, I explained, nor could she live her whole life on a respirator. Tracheal agenesis, I told him, is irreversible.

I reassured him that his visit was important and that all he could offer Amy was comfort and closeness while she died. When he was ready to let her go, I took Amy off the respirator. Her father took her in his arms, and the three of us went into a quiet room. He rocked her, solemnly confiding all the plans he had made for her and her mother. When he could tolerate the draining emotions no longer, he passed her to me and cried while he watched me rocking her. To confirm the existence of this life we had nurtured for such a short time, we took pictures as each of us held Amy.

Then we unwrapped her

and gave her a warm bath, and he seemed to explore once again the perfection she so mysteriously embodied. Before Amy died he said that he could see his wife in her face.

We spent several more hours together, and when he left, he thanked me for staying with him. But I was the one who was privileged to share this moment with him. For this man and his wife—for all of us—it is the sharing and confirming of memory that makes it possible to survive tragedy. Memories are all a parent has when a child is gone. Even a life as short as Amy's contains its small store of memory.

A great many people wonder what exactly nurses do. In this case, I did more than provide complex technical care for an infant. I was the camera that recorded this child's existence. I witnessed and affirmed that her brief life was not an illusion, that it had dignity and value. ■

DENISE MAGUIRE is a nurse manager in the special care nursery at Beth Israel Hospital.



Dracup, professor of nursing at UCLA and coeditor of the *American Journal of Critical Care*. "Ninety percent of the research in heart disease, to cite only one example, is based on mortality alone." But nurse researchers who study predisposing factors such as hypertension raise a range of other issues. "A patient could take a certain antihypertensive drug and live, but what if he becomes impotent or very depressed?" Dracup asks. Although physicians consider such variables in clinical practice, traditional medical research offers little help.

To alter that focus, Congress has created the Agency for Health Care Policy and Research, which mandates that nurses either cochair or sit on its panels, says Dracup (who is cochair of the panel on congestive heart failure).

Nursing research also challenges conventional wisdom about care-giving techniques. At the University of Texas Health Science Center, for example, nurse researcher Lynn Lotas is raising questions about hospital care for preterm infants—babies born at perhaps less than 1,200 grams who will be spending weeks or even months in a neonatal nursery. Most nurseries, like adult ICUs, are constantly illuminated, perhaps with periods of dimmer light. "But we know that regular light and dark cycles organize how human beings sleep and wake and regulate their temperature and heart and respiratory rates," says Lotas.

To help find out what the optimal conditions for a nursery might be, she and her colleagues measured the heart rates and temperatures of two groups of premies: one in a setting with structured light and dark cycles and the other in the typical neonatal environment. The researchers found that the heart rate of the babies in the first group dropped 10 beats per minute. "What we speculate this means is that there is an energy saving with these structured alterations," Lotas explains. "With preterm infants, that alone positively affects growth."

Lotas is now exploring this area further, and what she finds could have far-reaching implications. "One of the critical components determining how long these tiny babies stay in the hospital is how well they grow and how much weight they gain," she says. If nursing research can help shorten hospital stays, babies and their families will fare better emotionally and the financial costs of caring for premies, which can amount to hundreds of thousands of dollars per case, will decline.

Some nurse researchers are developing new technologies. For instance, Barbara Medoff-Cooper, associate professor of nursing at the University of Pennsylvania and a specialist in neonatal health care, has devised a diagnostic technology that helps identify high-risk newborns by looking at their sucking behavior. "If you're concerned that a baby may have some kind of neurologic problem,

it's hard to confirm those suspicions," Medoff-Cooper explains. "You can do a neurological exam, but that doesn't tell you very much unless the damage is severe. We think we can assess how a baby is doing neurologically by how he or she sucks."

So she enlisted a bioengineer and a computer scientist to help design a nipple that is connected to two tubes—one for regulating the amount of liquid received and the other for measuring sucking pressure. A computer analyzes sucking patterns while also recording heart rate, blood pressure, and oxygen levels. The instrument and accompanying software were originally used only at the Hospital of the University of Pennsylvania, but projects have now been set up at Children's Hospital of Philadelphia, Denver Children's Hospital, and elsewhere.

*By the year 2000,
the country will need
almost twice as many
critical care nurses.
Yet budgets for
nursing education
are being cut.*

Underfunded and Undervalued

Such advances in research and clinical practice should have transformed the image of nurses, but the public still views the medical universe almost exclusively through the prism of cure and overlooks the importance of care. As long as we remain ignorant of the complex care that nursing can provide, we will have difficulty making use of nursing expertise in the hospital and community. Moreover, the profession won't get the support it needs—even though it's a crucial part of health care and is becoming more important every day.

We need more nurses to deal with the growing number of patients who have chronic incurable diseases like AIDS and some forms of cancer. By 2030, some 20 percent of our population will be over 85, and since most elderly people have at least one chronic illness, they often require nursing care. Furthermore, U.S. hospitals are now discharging patients quicker and sicker, which means that people must deal with an extraordinary array of high-tech machinery and complex therapies at home. Nurses are the ones to help them do so, yet our health care system has not created a coherent system for care delivered in the home.

Indeed, the much-publicized nursing shortage of the

WHEN my wife and I arrived at the maternity ward of Anna Jaques Hospital in the middle of the night, it did not take us long to figure out who the real care-givers were. Beau's water had broken early, and a long labor was in store. That first night an obstetrician, still squinting from sleep, put in a brief appearance, then left us in the hands of the nurses at this suburban hospital north of Boston. And so it went over the next several days: doctors, remote and godlike, occasionally revealed themselves to us, but entrusted the actual running of their universe to nurses.

It was nurses who electronically monitored the baby's heartbeat in the womb and interpreted the seismic squiggles of Beau's contractions. It was nurses who watched her temperature for signs of infection, which can set in quickly once the amniotic membranes have ruptured. It was nurses who suggested ways of speeding up the labor and making the pain more bearable. And during the final pushing phase, as I grasped an arm and a leg and cheered Beau on

from the right, it was a nurse who held the other arm and leg and cheered from the left. After three days of labor, we had a healthy baby boy.

The nursing staff had more than earned the pepperoni pizza I brought them afterward, but their work was not yet over. The next morning, Beau complained of a headache. She was seriously confused—unable to remember the name of the hospital, and some 20 years off in her recollection of the date. Although the obstetrician on duty was

stymied, a nurse soon spotted the temperature rise that signaled an infection. It turned out to be meningitis. Strep bacteria had entered Beau's spinal column—possibly when she received an epidural anesthetic during the delivery, though no one can say for sure.

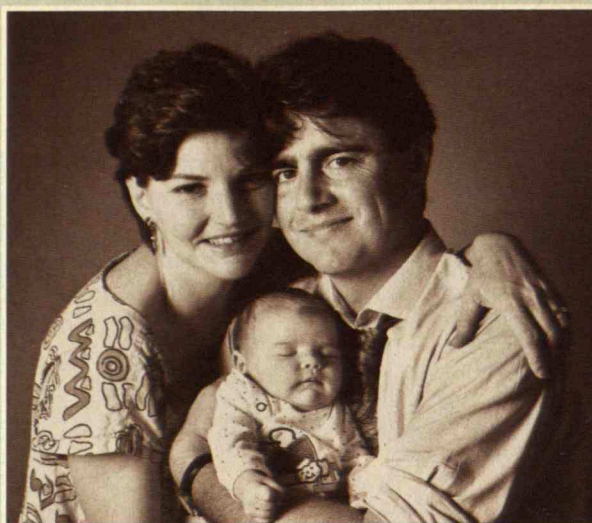
The nurses sprang into action. When a CAT scan was ordered, they opted to wheel their patient to radiology themselves rather than wait for the transport staff. I overheard one nurse on the phone sternly demanding that a certain test

kit be sent up that instant. Another nurse ran after the consulting neurologist to find out what antibiotic he planned to prescribe, so she could fax an order to the pharmacy. In fact, the nurses displayed the same sense of urgency that I myself felt but lacked the power or knowledge to act on.

As my wife recovered in the ICU, an intensive-care nurse provided constant attention and comfort. Meanwhile, in the nursery, I received lessons in bottle feeding and diaper changing, and baby Jack was tended by doting surrogate mothers.

Today both Beau and Jack are doing fine, and I find it ironic that much of the sophisticated medical care they received was administered by people who, like waitresses, we know only by their first names. Donna, Maureen, Beverly, Diane, Nancy, Anne, Pat, Tina, Sue, and their co-workers at Anna Jaques deserve far more recognition and status—as well as all the pepperoni pizza they can eat. ■

DAVID BRITTAN is an associate editor of Technology Review.



Nursing Mother

DAVID BRITTAN

last decade has not abated. Federal employment figures suggest that by the year 2000 the nation will need 738,000 more fulltime RNs—an increase of 54 percent. The American Association of Critical Care Nurses estimates that the health care system will have to nearly double the current supply of 223,000 critical care nurses. And the country will need about 203,000 more fulltime nurses in nursing homes as well as 81,000 more in community and public health.

The American Association of Colleges of Nursing reports that enrollments at four-year nursing schools have risen about 10 percent in response to high school recruitment campaigns. But the profession is having difficulty adjusting to even this modest increase. Because of cutbacks in education budgets, state legislatures are initiating hiring freezes and layoffs, and reducing professors' salaries. Nursing schools are being forced to turn away

qualified applicants. Many universities, including Yale and the University of Massachusetts at Amherst, have also reviewed their graduate and professional nursing programs to see if they can be trimmed or eliminated.

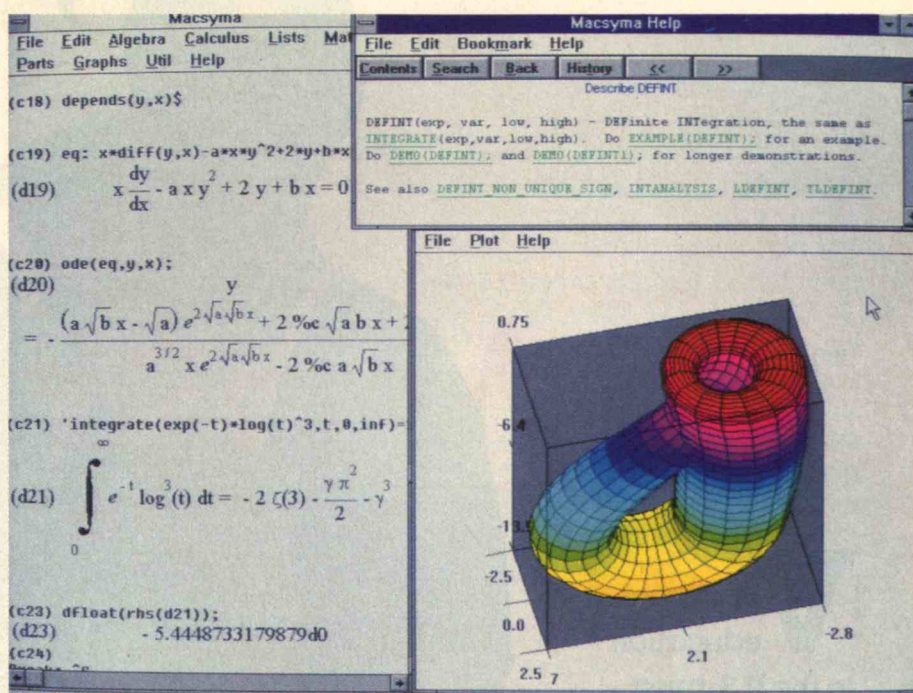
"Every week for the past year, I have been forced to defend the very existence of this school," says Melanie Dreher, the dean at Amherst. "We expect professors of management and engineering and Irish literature to have doctoral degrees. Yet we seem to be willing to cut programs that produce students who must deal with life-threatening situations and increasingly complex technologies." Judith Kraus, the dean of Yale's nursing school, is just as worried. "Care-giving is not some benign or benevolent activity that just anyone can do," she insists. "There is a science to care, just like there is to cure, and it takes education in institutions of higher learning to produce professional nurses. If we want these

kind of nurses to be available to the health care system in the twenty-first century, we have to educate them now."

Although both schools have fought off the threat of closure, both Dreher and Kraus believe that much more must be done to educate guidance counselors and college and university faculty about the opportunities for advanced practice in nursing. "Most of them are unaware of the many nursing specialties from which a bright student can choose," Kraus notes. "Although clinical nurse specialists, nurse practitioners, nurse researchers, and midwives are all well paid, most parents and counselors still view nursing as the choice for a kid who isn't smart enough to go to medical school."

Not surprisingly, this second-class status also colors attitudes toward nursing research. Barbara Lowery, associate dean at the University of Pennsylvania School of Nursing and director of the Center for Nursing Research there, sums up the dilemma succinctly. "Caring in this country is dramatically underfunded and undervalued." For example, she points out, the total appropriation for the National Institutes of Health this year is \$9 billion, of which slightly under \$40 million will go to nursing research—less than one-half of a percent.

In 1976, Joann Ashley, professor of nursing at Columbia University and author of *Hospitals, Paternalism, and the Role of the Nurse*, concluded her critique of the "structured inequality" in the health care system with the following prescription: "Healthy solutions to the problems in health care require that the public become more fully informed about its health and hospital system. No small step in this direction is that of understanding the growth and development of American nursing, since it provides the largest number of practitioners in the health care field." That diagnosis and cure has never been more relevant than it is today. ■



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Building a S

Vocational education in the U.S. must be expanded and modernized, in the manner of other industrialized countries, to help build high-performance work organizations.



Smarter Work Force



American enterprise has been organized

on the principle that most workers do not need to know much, or be able to do much, beyond what's necessary to perform narrowly defined tasks. The high productivity growth

By RAY MARSHALL AND MARC TUCKER

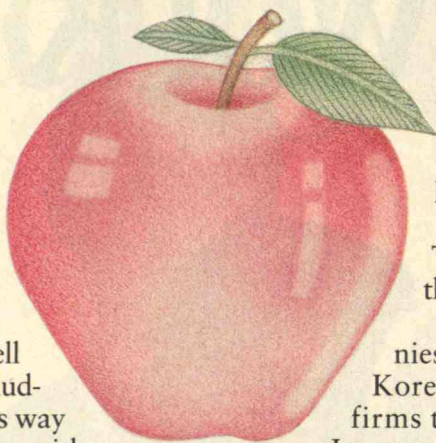
PHOTO: DOUGLAS E. WALKER

that the United States enjoyed until recently was made possible by giving our workers the most advanced equipment on the market. Today, however, the same equipment is available to low-wage countries that can sell their products all over the world—including here in the United States—at prices way below ours. If we continue to compete with them on wages and hours, as we are now doing, real wages will continue the decline that began in the 1970s and hours will increase until they match the low-wage competition. In short, the U.S. standard of living will plummet.

The alternative is to join the ranks of countries such as Germany, Japan, Sweden, and Denmark that promote high-performance work organizations. In such businesses, highly skilled, well-paid front-line workers are given many of the responsibilities of managers—tasks such as scheduling production, ordering parts, and attending to quality control.

The advantages of this form of work organization are enormous. The ranks of middle management and many support functions are thinned out, creating a large productivity gain. Quality improves dramatically. There is better coordination of the myriad functions involved in manufacturing a product, and far fewer mistakes. Improvements in design and construction are made constantly, instead of waiting for new model introductions, creating a strong market advantage. It becomes possible to go after small market segments, because success no longer depends on producing thousands or millions of identical products. Worker motivation and morale are greatly enhanced, because workers take real pride in their work. Taken together, these changes give firms a decisive edge over low-wage, low-skill competitors.

Unfortunately for the United States, high-performance work organizations hinge on a well-educated work force. The U.S. system of educating and training workers has been shaped around the meager demands of “scientific management,” where employers design the jobs of their front-line workers so that they require



little knowledge or ability. U.S. skill requirements look more like those of Third World countries than those of the leading industrial nations.

Third World skills are fine for companies that choose to compete with South Korea, Mexico, and the Philippines. But firms that want to take on Germany and Japan are finding themselves at a disadvantage. The scant minority—fewer than 5 percent—of American firms that are embracing high-performance forms of work organization report that they are experiencing or expect to face a shortage of skilled labor. If the vast majority of employers were to adopt high-performance organization, there would be a skilled-labor shortage of epic proportions.

The economic future of the United States depends mainly on the skills of the front-line work force, the people whose jobs will not require a baccalaureate degree. Success, then, depends on developing a program to prepare close to three-quarters of our work force to take on tasks in restructured workplaces that, up to now, have been assigned mainly to the college educated. The idea that Americans just turning 19 or 20 would come to the job equipped for such tasks might sound like the stuff of fantasy, but it is increasingly common in many European countries. If it does not happen here, the United States will simply be unable to attain the rates of productivity growth and deliver the quality that it must achieve.

So far, our record on educating workers has been grim. More than a quarter of American students—perhaps as much as half our future front-line workers—drop out of school. We do virtually nothing to recover them. We spend an average of about \$4,300 a year on our high-school students, but only \$235 a year trying to give those who drop out the education and job skills they will need to survive in our economy.

Half of our high-school students, and a much higher fraction of our future front-line workers, are in the “general” curriculum, enrolled neither in the academic track for the college-bound nor in the vocational track. Most of them emerge from school—with or without a diploma—with eighth-grade academic skills or worse. And they do no better with respect to vocational skills. Twenty-five percent of the vocational courses in the United States are taken by the general-curriculum students. The result is that most of our future front-line workers leave school with academic and vocational

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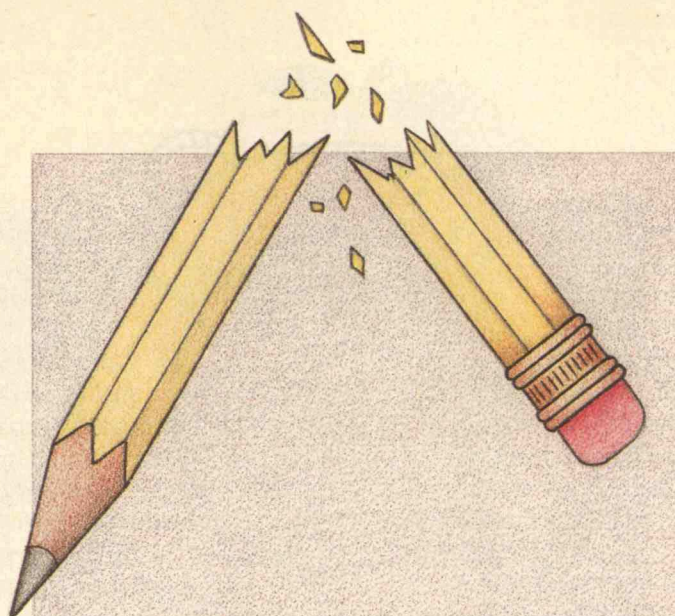
skills that fall below those of virtually all mature industrialized countries and many newly industrialized countries. In other words, they leave school with Third World skills.

U.S. employers spend about \$30 billion a year to educate and train their workers. But two-thirds of that sum goes to college-educated employees, and 90 percent of it is paid out by only one-half of one percent of the nation's firms. Therefore the vast majority of American front-line workers get no further formal education or training after they leave school.

How Other Countries Train Students

The extent of our failure can best be seen by comparing what we do with the job-training systems common in other countries. The methods by which Japan, Germany, Sweden, and Denmark arrange for a high level of vocational competence among their front-line workers differ greatly, but the result is the same: all four nations boast work forces that are among the most highly skilled in the world.

In Japan, the best vocational education occurs in companies. The country's well-known system of lifetime employment in the large firms, combined with the Japanese practice of shifting workers from one job to another, makes employers more than willing to pay for job training; they know that the investment will be recovered. By 1992, for example, Toyota plans to put all new high-school graduates it hires for the front line



No nation in which a quarter of the students fail to complete secondary education can hope to have a world-class work force.

through a two-year full-time course in digital electronics and "mechatronics." The company's assembly-line workers will then have roughly the same qualifications as junior engineers in the United States.

Schools still play an important role. They are closely linked with employers and typically provide their graduates with a smooth transition to the workplace. Japanese firms look at the schools as they look at any other supplier, cultivating close relations and demanding the highest possible quality.

The process by which young people enter the work force takes place in stages. First, firms send literature—and even videotapes—about themselves to schools at all levels. Recruiters stay in touch with high-school teachers, taking them to lunch, inquiring about the quality of their students, and urging them to encourage their best students to consider employment at their firm. Just before the students gradu-

ate, the big firms ask the principals of schools with which they have a special relationship to select the most qualified students for the available jobs on the basis of their academic performance as judged by the school staff.

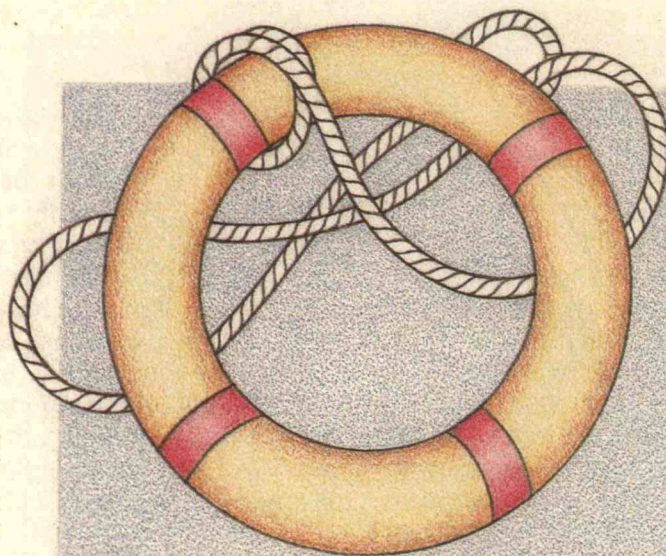
The Japanese system provides a powerful motivation to all non-college-bound Japanese youth to do well in school, because the judgment of one's teachers is crucial. It also gives teachers far more authority than those of the non-college-bound in the United States

have ever dreamed of having. Most important, it provides a swift, dependable entry for Japanese youth into real careers in the labor market.

In Germany, work is built on a centuries-old craft tradition, where workers tend to identify less with a particular company than with the trade or occupation in which they apprentice, become journeymen, and achieve—or hope to achieve—master status.

The German skills-development system begins early in school with the *Arbeitslehrer*, a formal program about industry that is compulsory for all grade-school students except those in a *Gymnasium*, a secondary school for college-bound students. Then, at age 15 or 16, most students not going on to college become apprentices with an employer in one of 480 trades and occupations.

Apprentices typically spend one day a week at a *Berufsschule* (state vocational school) specializing in the student's trade and four days in a structured program of training at the employer's work site, guided by a master. In their two to three years of training, the apprentices receive a training wage, which gradually increases. At the end of the contract period, the apprentice faces a pencil-and-paper exam and a careful review of selected work samples. Apprentices who pass are awarded a certificate honored by employers all over Germany that attests to their having the skills required to assume journeyman status in



By guiding out-of-school youth into job-training programs, Sweden's Youth Centers put most dropouts back on track toward productive careers.

their trade or occupation.

Given the costs that must be borne by the firms and the detailed regulations they must follow, one wonders why they don't just let the competition train future workers and then hire them away, much as U.S. firms would. But the companies view apprenticeship as a profitable investment. Since 90 percent of the apprentices remain employed by the firm that trains them, companies can tailor training to their specific needs. Many managers came up through the apprenticeship system and take great pride in continuing the tradition. And because all the large firms train, none are afraid that a nonparticipating firm will take unfair advantage.

These German apprenticeships constitute a national mentoring system, resulting in the superb preparation of the front-line worker that is a key factor in German economic success.

In Sweden, work experience begins at age seven, in first grade. Swedish students spend from one to several weeks a year in

various kinds of workplaces, finding out what people do and how they do it. Representatives of employers visit schools as these kids are growing up, describing their industries and the careers within them.

When Swedish students are 16 and about to enter upper secondary school, they choose from among 27 courses of study within 6 divisions: arts and social sciences, care professions, economics and commerce, technology and science, technology and industry, and

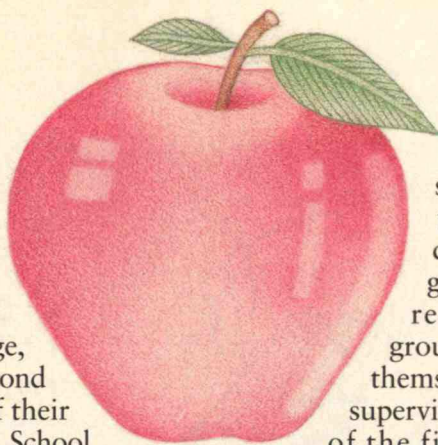
agriculture, horticulture, and forestry. All these programs include core courses in Swedish, English, and mathematics.

For the 75 percent of Swedish students who do not plan to go to college, 10 to 20 percent of their first and second years, and as much as 60 percent of their third year, are spent in the workplace. School vocational counselors, advised by industry committees, are responsible for organizing the "work-life" experiences of these students. Through the three years of upper secondary school, the student's field of vision narrows from familiarization with the occupational requirements of a broad industry group to the development of strong skills in a particular job. But the Swedish system, unlike the German, is designed *not* to commit youth to a narrow specialization for life. By exposing young people to a wide range of occupations, Swedish authorities hope to enable citizens to shift occupations with relative ease.

In stark contrast to the United States, Sweden also has a national dropout recovery program. In 1980, the Swedish Parliament enacted legislation holding every municipality responsible for locating disadvantaged and disaffected out-of-school youth between the ages of 16 and 18, recruiting them into a job-training program, and securing work opportunities for them. The result is the country's system of Youth Centers, which has been highly successful in putting the vast majority of dropouts back on track toward productive careers.

Denmark goes even further than Sweden in ensuring that its non-college-bound students will be able to apply their skills in a range of trades. As in Germany and Sweden, most Danish youth not going on to university participate in a three-year program of combined work and study after they complete the tenth grade. Periods of work alternate with time spent in study at a technical college. But the Danes also try to impart generic "work skills"—such as self-motivation, communication, organization, and creativity—that employers value in high-performance settings.

In a large company, the work-study program begins with a few days of orientation, followed by 6 to 12 months of training in teamwork and the functioning of self-governing groups. Then comes a brief period of formal individual training. The rest of the program, about two years long, consists of project-based,



self-directed learning. Groups of trainees who intend to specialize in different but complementary areas are given complex long-term projects that require the skills of everyone in the group. The teams are expected to organize themselves and to reach their goal without supervision. They have access to any member of the firm and to any of its information sources, but they must locate the people and information on their own.

Team members keep diaries recording the problems they encounter, the approaches they are taking to address them, and the progress they make on acquiring the skills they need to meet the standards set by the employers. Each trainee meets regularly with his or her teachers to evaluate progress. The students are expected to constantly assess their learning; the teachers act like mentors and coaches but do not engage in direct instruction. This scheme has become a paradigm of the work environment in a high-performance organization.

Another appealing feature of the Danish vocational system is that it leaves the door open to higher education. As Danish youth progress through the job-training system, they are free to take courses that, if passed, qualify them for admission to university. In this way, the Danes have made explicit provisions for a no-dead-end system, one where people can always advance to the level of opportunity that more education affords.

Revamping Vocational Education

In describing what other countries do to ensure a successful transition from school to work, we do not mean to imply that nothing of value goes on in the United States. We know of secondary vocational schools, for-profit technical schools, and community colleges that prepare their students well for challenging and rewarding careers, that have strong ties to employers, that are responsive to shifting industry requirements, and that have the latest equipment on which their students can train. We know of good grade-school programs that acquaint students with a wide range of careers, dropout recovery programs that plainly do what they were intended to do, and curricula that are explicitly designed to help students develop generic work skills.

But these are all isolated occurrences, running against the grain of a system that produces, overall, dismal results. What the country sorely lacks is a system that embraces the great majority of our students and prepares them to become productive members of a highly capable front-line work force.

It is doubtful that we would serve this country well by replicating any of the systems of other industrialized nations. We can certainly learn from their successes, but we must keep in mind their different cultural contexts—and outright shortcomings. For example, the Germans are themselves concerned about the rigidity of their system of narrow lifelong specialization in trades and occupations. What's more, the strong pride in the ancient German craft system that motivates employers to invest large sums in vocational education voluntarily is wholly lacking in the American experience.

The Japanese system, where the schools are responsible for producing graduates with a high level of "general intelligence," would appear to be much better adapted to a world of changing job requirements. But this system, too, has liabilities. Although large employers make massive efforts to provide first-rate vocational skills to their new hires, these firms employ only about a third of Japanese workers, leaving the others to depend on a weak backup network of state-run vocational schools. The other drawback of the Japanese system is the lack of any formal national system for recognizing voca-

tional qualifications. In a highly mobile country like the United States, such a system is essential if individuals are to invest in themselves and have the opportunity to realize that investment when they move.

The United States must construct its own system for developing strong technical and professional skills in high-school students not going directly to a four-year college—a system that builds on the best practices of the leading industrial nations. Specifically, that means:

Setting aside several weeks each year for grade-school students to visit work sites and learn about the range of career opportunities.

All students need this exposure, not just those headed for the workplace right out of school. Most of our children learn about what goes on at work from movies and television, which give a highly distorted picture. The problem is particularly severe for poor and minority children, but it applies in some measure

to almost everyone. There is no substitute for visiting workplaces and talking to the people who work in them.

Many U.S. educators reject the idea that schools exist in part to prepare people for work. This view partly accounts for the primacy of college as the only goal worth working for in school—but this has to change. Teachers themselves will have to be persuaded that work not requiring a college degree can be challenging, rewarding, and the source of real sta-



tus. That task should become easier as the number of high-performance work organizations grows.

Creating a system of youth centers through which municipalities recover dropouts.

No nation in which a quarter of the students fail to complete secondary education can hope to have a world-class work force. South Korea's dropout rate is only 10 percent, and Sweden's rate—thanks to its Youth Center program—is even less. Every state should require its municipalities to operate alternative education and work-experience programs based on the Swedish model. Whenever a student dropped out of school, the school district would have to notify the nearest youth center, which would then actively recruit that student.

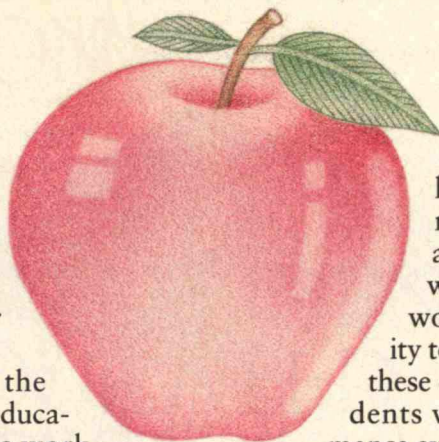
Many existing programs—ranging from the Job Corps to programs run by churches and community organizations—already have the capacity to do some or all of the functions we would assign to youth centers. The youth centers would contract with such organizations and with school districts to get the job done. The point is not so much to create new institutions as to designate one local agency to take sole responsibility for recovering every dropout.

How to fund such a program? Every local, state, and federal dollar earmarked for a student's education in a regular high school should follow the dropout to the youth center. While this will not be an easy requirement to meet for states and localities experiencing hard fiscal times, there is overwhelming evidence that the nation would save far more in reduced welfare and prison costs.

Building the vocational education system on a base of real academic accomplishment.

Without exception, the countries with the most successful vocational education systems realize that job training must be complemented by solid academic skills. In most U.S. school districts, one can get a high-school diploma if one shows up most of the time and does not cause any trouble. The states that do impose some sort of performance requirement rarely set the standard above seventh-grade equivalency.

We urge adoption of "certificates of initial mastery," to be awarded to most students around age 16 when they pass an appropriate examination. The subject matter would encompass reading, writing,



listening, and speaking, as well as mathematics, the sciences, history, and the social sciences, the arts, and work skills, but the examinations would place a premium on the capacity to integrate knowledge from many of these disciplines in solving problems. Students would be able to take the performance exams as often as they liked until they passed them.

By setting a single standard for everyone, we break ranks with the Europeans, who use their exams to sort students out, dividing those who will go to college from those who will not. Students who get their certificate would be able to choose whether to begin a technical and professional certificate program, enroll in a college preparatory program, or go directly into the work force.

Providing access for all students who want it to a high-quality on-the-job learning experience leading to a universally recognized qualification.

The United States ought to create a system of technical and professional certificates covering most trades and occupations not requiring a four-year college degree. The certificates would be awarded when students completed a three-year program of combined schooling and structured on-the-job training and passed a written and practical examination. Programs could be offered by many kinds of institutions—high schools, vocational schools, employers, community colleges, and for-profit technical schools among them—working singly or in combination, but always teamed with employers offering the job-site component. These institutions would compete for students' tuition.

Much of the money required to meet this commitment would come from a repackaging of government funds now spent on the last two years of secondary school and the first two years of college. But other funding could come from employers, especially if—as we recommend below—firms are required to contribute to the continued education and training of their employees.

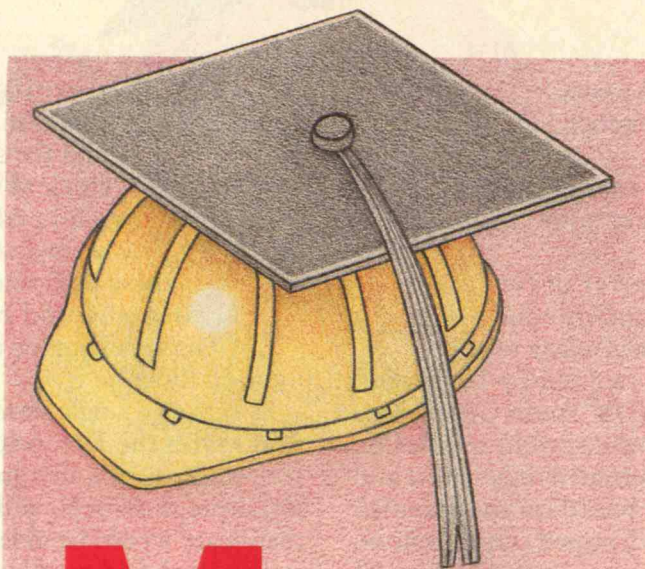
Each state and industry should have a strong voice in constructing the system and an equally strong role in administering it, but it must be a national system, with national standards, nationally recognized certificates, and a system of occupational classifications that do not vary by jurisdiction. Anything less will lead to a system that will reduce the mobility of our work force

or lower individuals' incentive to train, or both. The country will almost surely begin to create this system industry by industry and state by state, but the aim from the start must be to make it truly national.

Designing the work-based portion of the program so it develops the qualities needed for high-performance work organizations.

The United States faces something of a dilemma. On the one hand, a system of technical and professional standards is urgently needed, and it is only common sense that these standards should be largely set by employers. On the other hand, most employers today would design standards around jobs that ask little of the people who have them.

Perhaps the United States should rely mainly on employers who are using advanced forms of work organization to formulate the new standards and then devise a curriculum, much like that of the Danes, explicitly to prepare our youth to function in the new work milieu. No doubt many young people will be employed at first by organizations that are not prepared to give them all the responsibility they have been trained to exercise or take advantage of all the skills they bring to the job. But these new employees can be powerful agents of change and can make it easier for forward-looking employers to restructure their workplaces.



Most advanced nations require companies to invest at least 1 percent of wages in continuing education and training. So should the U.S.

Providing incentives to employers to invest in developing their employees.

Most advanced nations and many newly industrialized countries require employers to invest a sum equal to at least 1 percent of salaries and wages for continuing education and training. The United States should require companies to do likewise—or, if they are unable or unwilling, to contribute to a government-operated Skills Development Fund, which would supply the education and training. Only expenditures on programs leading to state educational certificates, industry-wide training certificates, or recognized degrees would satisfy the requirement.

The situation is urgent. If we continue on our low-performance work track, real wages will fall much faster in the next 20 years than they have in the last 20. As that happens—and as the proportion of our population in the work force continues to drop—tax revenue will fall, and the investment capital required to educate and train our front-line workers will be increasingly

hard to come by. Many states already find themselves in just such a bind. If we do not change course before 2010, when the baby boomers—77 million people—begin turning 65, and straining our pension and health resources, we could truly reach a point of no return.

If ever there was a time to make the choice for a high-skill work force, it is now. ■

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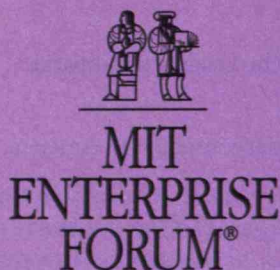
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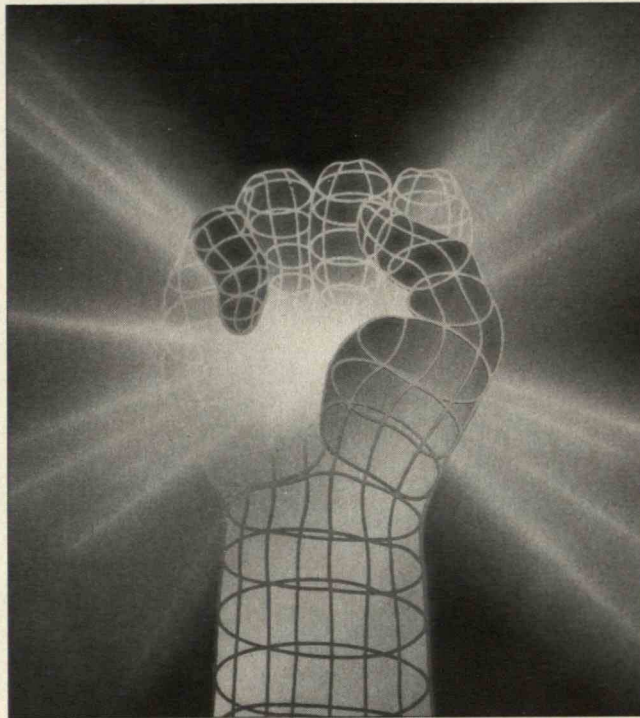
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Finding the Fountain of Youth

PHOTO ILLUSTRATION: WENDY BRAUN



*Research with fruit flies
points to the possibility of
someday postponing
human aging substantially.*

By MICHAEL R. ROSE

FEW of humanity's dreams have been more persistent than the wish to obliterate aging. Some of our most widespread myths tell of fountains of youth, magic elixirs for recovering potency, and mountainous villages where the elderly remain eternally spry.

Not only do all people age, but with the exception of organisms that can reproduce by splitting in two, such as some worms and sea anemones, so do almost all animals. Many plants age, too. Aging must be caused by some profound property of life, many health-food fads to the contrary.

The most sustained attempt to find a well-defined biochemical cause of aging has been mounted by the discipline of gerontology. Founded early in the twentieth century and prominent since World War II, gerontology has amassed a considerable storehouse of descriptions of the aging process. Gerontologists have proposed a variety of theories to explain aging, such as mutations in the body's cells and positive feedback of erroneous information in cell metabolism. But the field has recently undergone an intellectual collapse. One by one, gerontology's favored molecular theories to explain the general process of aging have been demolished experimentally.

All is not lost, however. Ironically, now that most educated people regard the postponement of aging as an unattainable fantasy, we may at last be on the threshold of achieving it. Evolutionary biology can explain the cause of aging.

Why We Age

Evolution works by natural selection, a process that gives an advantage to the genes in organisms that survive long enough and reproduce often enough to leave many offspring. Because genes that make organisms reproduce more and survive better have an evolutionary advantage, they sweep through populations.

Commercial competition provides a familiar analogy. If a particular automobile manufacturer can produce more cars at lower cost, but of the same or better quality, then that company will take over the market, if the market is fair. The manufacturer is more efficient and therefore a better competitor. That is why Lexus is displacing Mercedes-Benz; Toyota can build the Lexus at a lower cost, and so set a lower price.

But why hasn't natural selection gone to its logical extreme? Why haven't more organisms developed that can continue surviving and reproducing forever, without aging? Immortality is biochemically possible: the cells from our parents' ovaries and testes, which made the eggs and sperm that produced us, were part of a line of similar "germ" cells stretching back hundreds of millions of years.

MICHAEL R. ROSE, professor of evolutionary biology at the University of California, Irvine, is the author of *Evolutionary Biology of Aging* (Oxford University Press, 1991).

But this doesn't happen with our other cells. To understand why natural selection no longer keeps our bodies alive and functional after a period of adulthood, consider a gene that, in a specific age range, kills every person with even one copy of it. The gene for Huntington's chorea, the disease Woody Guthrie died of, kills all of its carriers in middle age but has no bad effects before the middle twenties, at the earliest. In contrast, there are diseases like progeria, also thought to be caused by a single gene. Progeria produces horrific premature aging in children, with victims dying by their early twenties. Only about 20 carriers of this gene are known worldwide, compared with many thousands of carriers of the gene for Huntington's chorea.

The crucial difference between these diseases is the age at which the carriers die. Huntington's chorea acts after most of its carriers have reproduced, so that the gene can remain in, and spread through, human populations. Progeria prevents all carriers from reproducing.

As these examples attest, natural selection stringently removes lethal genes expressed so early that individuals usually do not reproduce, but it does not influence those genes expressed late in adulthood. Natural selection's abandonment of us is a gradual process, related to the timing of reproduction. Our survival matters less and less as we advance from childhood through our reproductive years to old age. From an evolutionary standpoint, once we are senior citizens it matters little whether we die. Thus, mutant genes that affect only older adults can spread through populations. We are genetic garbage cans for those genes that produce bad effects at later ages.

The principle of natural selection also indicates why the sea anemones and other species that reproduce by splitting in two do not age. Once a reproductive act occurs, there is no adult, just two juveniles. Because there is no post-reproductive life-cycle stage, any gene harming survival must play its role before reproduction—and such a gene is not likely to be passed on to future generations. Organisms that split in two equal parts differ markedly from those that lay eggs or bear live young. Only the latter group suffers the fading out of natural selection and becomes decrepit with age. Sadly, we are in that group.

This pattern of selection influences the evolution of entire populations, of course—not that of individuals. Because the genes in a single body are a product of past evolutionary history, not just individual circumstances, a person could not escape aging by remaining celibate for 80 years. Evolution is like a great ocean-going ship, with too much momentum to reverse itself immediately.

A Funny Thing Happened...



In my lab, we have produced flies with an 80 percent increase in life span.

Delaying Aging in Fruit Flies

If reproduction is delayed for many generations, however, evolution does postpone aging by making natural selection stronger at a later age. In the laboratory, researchers have delayed the age at which fruit flies bear offspring, and thus, after 10 or more generations, extended the flies' "juvenile" period of strong natural selection into the adult phase.

This can be done because natural selection does not respond to sexual maturation alone, but to the start of successful reproduction. A human analogy would be career-conscious baby-boomers who, though certainly past puberty and probably sexually active, put off having children.

In the experiments, the average and maximum life spans of the fruit flies rise. In my lab, we have produced flies with an 80 percent increase in life span, after 12 years—70 generations—of delayed reproduction. Just as automobile engineers can design a car that is much longer-lasting (assuming that owners change the oil), so too can natural selection produce an organism that is longer-lived.

Physiological studies we have conducted of the flies that live longer show that in many ways they are "superflies." They have greater flight endurance. They walk around more when they are older. They keep increased caloric reserves, like fat, for resistance to

stress. They are better able to cope with the destructive byproducts of their metabolism.

One qualification to this picture is that they are not quite so hot sexually when they are younger: the females lay fewer eggs under normal conditions and the males are not as good at competing for mates. But when they're older, often when normal flies would have long since died, the females lay many eggs and males mate repeatedly.

Given the overall result of our work—that we can do something about aging—the important question that remains is the feasibility of postponing aging by methods other than selection. We aren't going to make human reproduction before the age of 40 illegal, just so our descendants 200 years from now will have greater life spans.

One alternative may be delaying aging through specific genes. James E. Fleming, formerly a molecular biologist at the Linus Pauling Institute in Palo Alto, and the late Robert Tyler, who was a graduate student in evolutionary biology at the University of California, Irvine, recently found one such gene for flies. It codes for the enzyme superoxide dismutase (SOD), which first scavenges the body for a particular molecule that can damage tissue and then starts a process that eventually converts the molecule to harmless water. Compared with normal flies, those with postponed aging more frequently carry a form of this gene that results in the pro-



The next step toward
prolonging human life must be to study another mammal.

duction of more active SOD. Fleming obtained an approximately 10 percent rise in life span in normal flies after inserting into them another gene that codes for an extremely active version of the enzyme.

Postponing Human Aging

If we were just like flies, we would be well on the way to postponing our aging by means of genetic engineering. But there is every reason to suspect that the biological controls of aging in humans will not be the same as those in fruit flies. Because flies do not have hearts, they don't get heart disease. They don't even get cancer. Flies and humans are such different beasts that acting on the temptation to jump directly from fruit-fly findings to medical intervention in humans would result in disaster.

The next step toward prolonging human life must be to study another mammal. We need to create lab mice, for example, whose aging is postponed by selection. Then, using genetic and perhaps physiological methods, we can find out how to postpone aging in a mammal directly, without selection.

For more clues on aging, we can examine rodents whose dietary intake has been reduced moderately while they continue to receive essential nutrients and vitamins and are kept in a germ-free environment. One of the few widespread generalizations about aging in animals is that if they diet, they live longer. Both rats and mice can live 20 to 40 percent longer if forced to diet.

Somewhat like the reduced early fertility of young female fruit flies with selectively increased life spans, female rodents that have been put on diets become non-reproductive. Reduced nutrition may postpone aging because it saves the rodent from some physiological cost of reproduction. Scientists have thoroughly documented that the reproductive period, which includes care of offspring, has disadvantages ranging from reduced resistance to disease and stress to increased predation by other animals. This has been shown, for example, by castrating salmon and marsupial mice; such animals have greatly increased life spans.

There is little reason to suppose that humans are so special that none of the rodent research will someday apply to us. But since not all of it necessarily will, we will need to test on people any diets or compounds that are eventually found to work with rodents.

While I predict that there will be no shortage of human volunteers, the endeavor is not going to be easy or cheap. The only reason to consider it is that the easy and cheap "solutions" that keep arising, as they have for millennia, do not work. The real fountain of youth will not be tapped by science hobbyists working out of garages or nonscientist physicians experimenting with patients. Rather, the discovery will require dedicated research by biologists using technologies ranging from selective breeding of rodents to gene identification. Only now do we have the science foundation upon which to conduct effective studies on aging. ■

A Funny Thing Happened...

HUMORIST Russell Baker recently wrote a column about the complex new phone system that his office had installed. He confessed that he was afraid to take lessons in how to use it. What if he flunked the course? "It would be humiliating," he wrote, "having to go to summer school to make up a failure in Telephone."

Baker went on to express the bemusement of the average citizen trying to cope with rapidly changing technology. Although the telephone originally "was a swell idea," he finds several of its latest developments—voice mail, for example—baffling and bothersome. The droll essay was entitled "March of the Engineers."

A few weeks later, Baker reported that several engineers had written to him to complain. One correspondent had accused him of having "a narrow-minded and pernicious antitechnology attitude." "Worse," noted the columnist, "he thinks I contribute to the decline in the number of Americans studying engineering." After assuring his reading public that he appreciated the importance of technology, and engineering education in particular, Baker went on to gently chide his engineer critics for becoming so indignant. In a parting shot, he restated—humorously yet earnestly—his plea for user-friendly telephones, and for a VCR that might be programmed "without a degree in electronics."

Is it possible that we engineers don't have a sense of humor? Occasionally one hears of technically ingenious pranks, such as when engineering students take apart a car and rebuild it in a dormitory room, or modify a classroom clock so that it can be sped up or slowed down to fluster a professor. But most engineers are sober and serious, particularly when discussing their work. In a recent survey, three-quarters of U.S. journalists agreed that engineers could aptly be described as "wooden." I think that's a bit harsh. I meet a lot of engineers, and generally find them congenial company. But engineers do not suffer fools gladly, and I fear that they are not as tolerant as they might be when it

comes to deciding who is a fool.

The trouble begins, perhaps, with the precision inherent in engineering work. Technical problems usually have correct answers, or at least optimal solutions. Engineers learn to be suspicious of whimsy, caprice, and absurdity, the very stuff of humor, but dangerous notions when public safety is a consideration. The situation is made worse by the people who malign engineers. Many of these antitechnologists are themselves humorless and bellicose, and a few are patently foolish into the bargain. So, influenced by the nature of their own professional work and goaded by their critics, engineers become irascible and end up scolding an amiable newspaper columnist.

I favor humor for serious reasons as well as for love of a joke. To the extent that engineers have indeed lost their sense of humor, the profession, and society at large, pay a heavy price. As Baker

engineering than did the amusing—and usefully challenging—original essay.

A notable exception to the defensive tone adopted by so many engineers is the bimonthly "Reflections" column written by Robert W. Lucky for *IEEE Spectrum*. As executive director of research at AT&T Bell Laboratories, Lucky stands at the forefront of the engineering community, which makes his merry spirit all the more precious. He directs his humorous barbs at such likely targets as the guilt of having fun at technical conferences, the inevitable failure of equipment demonstrations in the presence of Members of Upper Management ("the MUM effect"), and the lack of communication within organizations ("we all have the comforting illusion that there is someone up there who knows what is going on"). But he is also able to apply wit and a light touch to topics such as citizen advice to govern-



noted, many people have trouble coping with changing technology. An austere and aloof community of engineers only makes this alienation worse.

Equally important, if engineers are to participate in the great communal debates and take on leadership responsibilities—as I and many other people think they should—then they must learn the niceties of discourse, beginning with wit and empathy. If one wants to be persuasive, grumpiness is not the characteristic to cultivate. I dare say that the engineer who, in front of several million readers, called Russell Baker narrow-minded and pernicious did more to discourage young Americans from studying

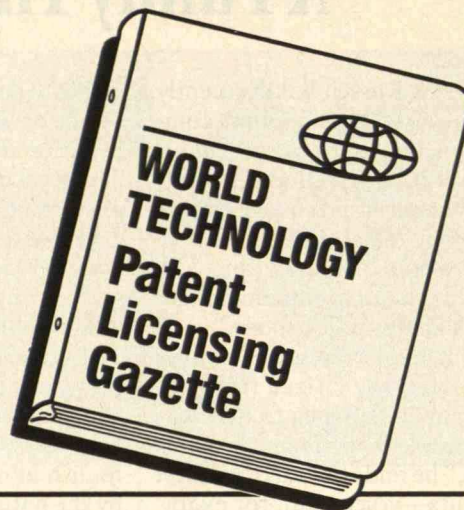
ment, the public image of engineers, and the loss of U.S. preeminence in certain technologies.

Lucky's columns are cheering not only in themselves, but also because they appear in the official publication of the world's largest engineering society. One can only infer that some engineers resonate to his spirit. May their numbers multiply. We need to cultivate humor in the engineering community. This is no laughing matter. ■

SAMUEL C. FLORMAN, a civil engineer, is the author of *Engineering and the Liberal Arts*, *The Existential Pleasures of Engineering*, *Blaming Technology*, and *The Civilized Engineer*.

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The Roots of Short-Termism

Critics have been saying for years that U.S. businesses systematically underinvest in ventures that lack a near-term payoff. Many economists have dismissed this critique as anecdotal. But an extraordinary new outpouring of research, synthesized brilliantly by Harvard Business School's Michael Porter, provides hard evidence that the critics were right all along.

This Time Horizons project was conducted jointly by Harvard and the Council on Competitiveness (the nongovernmental organization that favors industrial policy, not Vice-President Quayle's antiregulation group of the same name). The project confirms that the Germans and the Japanese inherited from their pasts, and then refined during the postwar era, a set of institutional arrangements that favors long-term growth over short-term earnings. Harvard's Lawrence Summers and MIT's James Poterba found from interviews with CEOs that U.S. investors demand much higher rates of return than do their foreign competitors.

On average, U.S. companies have been foregoing new endeavors unless their expected inflation-adjusted payoff is at least 12 percent per year. This is an unreasonably high "hurdle rate," given that the real cost of the money used to finance these investments ranges from as little as 2 percent (through borrowing) to 7 percent (through dividends paid to stockholders). Foreign corporations have lower hurdle rates. They also devote a healthier share of their R&D to what their CEOs consider to be long-term projects: 47 percent for the Japanese companies studied and 61 percent for the Germans, versus only 20 percent in the United States.

Because of this fixation on short-term gain, U.S. business is underfunding projects that add to the national stock of productive capital and could eventually create jobs, technological opportunities, and long-run profits. Instead, our companies invest disproportionately in real estate and in acquisitions of unrelated businesses.

Why do our foreign competitors take a longer view? In Germany and Japan, a corporation's major stockholders tend to be involved with running, or at least closely monitoring, the company. Customers, suppliers, and bankers own shares of one another's stock. Not so in the United States, where such cross-ownership is severely restricted by law. Here, insurance companies, mutual funds, and individual investors know little about the details of making steel, microchips, or software. Instead, U.S. investment firms employ armies of financial analysts who typically base their recommendations on what can be most easily measured, such as quarterly earnings. As a result, during the 1980s, U.S. pension and mutual funds held onto a share of stock for under two years, on average, compared with the seven years that was typical in 1960.

Inside U.S. corporations, things aren't



much better. Boards of directors are made up of executives of unrelated firms who often know little about the business they are "directing." And the firms themselves have become so complex—especially after 30 years of mergers and acquisitions—that even their senior managers have difficulty communicating across divisions. Executives resort to management by the numbers, focusing their sights on easily measured goals such as maximizing stock prices. U.S. companies also compensate their senior managers substantially with stock options, which only ties executives' behavior that much more closely to current share prices instead of long-term prospects.

I have barely scratched the surface of Porter and Co.'s encyclopedic accounting of the reasons for American short-termism. A few additional points:

- Takeovers are "nonexistent" in Japan and "next to nonexistent" in Germany.

- Capital gains of Japanese insurance companies must, by law, be reinvested in the firm whence they came.

- In Germany, pension funds are customarily invested only in the stock of the employer company. U.S. standards of prudence require diversification. But the German practice increases the amount of capital available to the company.

- Even the accounting practices of German and Japanese companies reflect a long-term orientation. They count as capital investment a number of expenses that U.S. companies consider operating costs, such as R&D, employee training, and the initial losses associated with entering new markets.

The Time Horizons project clearly shows that companies are products of mutually reinforcing rules and beliefs for regulating the allocation of capital—and that some of these institutions are better at meeting global competition than others. That short-termism is a genuine problem is now proven. It is time to begin a national debate about overhauling the laws, regulations, and customs that contribute to these self-defeating ways of doing business. ■

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If It Ain't Broke, Don't Break It

My 1963 Dodge Dart convertible has three heater controls. They're big round knobs. They're easy to find, and I can tell them apart even in the dark. Nearly 30 years of technological progress brought us the 1990 Buick, which uses 14 buttons to accomplish essentially the same functions. The 14 buttons are all exactly the same size and shape, and they're all perfectly flat, so as to be indistinguishable by touch. It seems to me that any control in a car that requires that I look at it is inherently wrong.

Unfortunately, these kinds of mistakes seem to be the rule rather than the exception. I test drive 50 to 100 new cars a year, and I am struck by the incredible proliferation of blatant ergonomic errors. I've been pondering this situation and I suggest the following taxonomy of blunders that designers succumb to:

1. Using a technology not because it's appropriate but "because it is there" (the Sir Edmund Hillary School of Ergonomics).

2. Being different at any cost.

3. Reinventing whenever possible.

4. Copying nothing, not even good ideas: it's embarrassing to admit that you didn't think of them yourself.

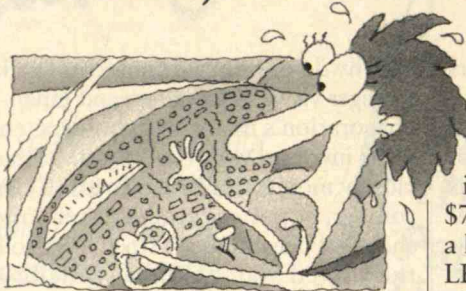
5. Just plain stupidity (otherwise known as the Ted Williams Theory; he once advised a not-too-bright teammate: "If you don't think too good, then don't think too much").

6. Too many cooks.

7. Oops! Where the hell are we going to put *this*?



Consider these examples. A couple of years ago, I climbed into a mid-size American sedan with power everything. The seat controls were in the traditional location on the left side of the driver's seat. But when I reached down



to adjust the seat, my hand did not fit between the door and the side of the seat—I had to open the door to adjust the seat! This was a category 6 mistake—too many cooks: the designers of the inside door panel evidently didn't talk to the group designing the seat controls. No big deal, I thought—they'll fix it next year.

And fix it they did. Sort of. The following year, the power seat controls consist of nine identical flat buttons, a category 3—reinvent everything—error.

But where to put those nine buttons? Well, the car has a console between the bucket seats and they put the buttons on a vertical plate at the back end of this console, toward the rear of the car (category 7—where the hell...). Are these controls awkward to reach? Try touching the back of the chair you're sitting in with your fingers.

It gets better. Which button to press? To see the hieroglyphics printed on the buttons, I must not only take my eyes off the road, but I must look toward the back of the car. This clearly qualifies as a category 5 (just plain stupid) and a category 2 (be different).

This seat-control debacle is especially sad considering that about 10 years ago, Mercedes Benz designed the ultimate in power seat controls; it will surely go into the Ergonomic Hall of Fame for beauty, simplicity, and pure elegance. "If you want to control a seat," the Mercedes designers must have said, "why not make a control that's shaped like a seat!"

Can you do any better than that? Should you even try? Ford, to its credit, immediately copied this truly brilliant design. But Chrysler? Volvo? Even the Japanese, who built their reputations on copying? No, no, and no. And General Motors? Buttons. Indistinguishable but-

tons. It's a classic category 4 error (copy nothing).

(Despite Mercedes' brilliance with the seat controls, even they are not immune to plain stupidity. The \$70,000 300SE that I recently tested has a heater control with a 1-by-1/4-inch LED temperature readout in the center of the dashboard. We're supposed to read these tiny numbers *while driving*. Not only that, but the adjustment knob is so sensitive that I can barely "control" the temperature within 10 degrees as the vehicle is moving.)

Just how far can designers take their obsession with indistinguishable buttons? The answer comes from GM. "Why not," they must have mused, "put the controls for *everything* on a touch-sensitive screen." This touch screen takes the multibutton philosophy to a totally new level of stupidity. It can display thousands of buttons with *no discernible edges at all*. Can you feel a pixel? GM used touch-screen technology not because it made sense but because it was there.

*When it
comes to ergonomics,
is technology replacing
common sense?*

Another part of the car that is rife with technology run amok is the radio. Ironically, the best ergonomically designed radios are available from GM—but only if you buy the cheapest one. More money gets you technological overkill, like a graphic equalizer that displays the sound frequency spectrum so you can fiddle endlessly with the controls and watch the lights to get exactly the tone you want. A graphic equalizer? In a *car*? Now really. In my wife's Volvo, the radio has six buttons in a space about equal to the surface area of your fingertip. Since these buttons all do something wonderful, the designers must have reasoned, why

should you care which one(s) get pressed? Lighten up! Take a chance.

What, I ask, is wanting in a radio with two large round protruding knobs, like in my father's 1951 Dodge? And the 1956 Oldsmobile had a "seek" feature that could be operated with your foot! Do we really need more than this?

The car industry is guilty too often of technological excess and change for the sake of change. But elsewhere in our daily lives we encounter a machine—the refrigerator—that is an ergonomic failure for precisely the opposite reason: the newest ones aren't much different from my grandmother's. Maybe some of those GM engineers who can't keep their paws off something that works should get jobs at appliance companies, where they can fix something that's truly broke.

Think about it: I open the freezer about once for every 15 or 20 times that I open the main refrigerator compartment. So which one is at eye level, easy to see and reach? Right, the freezer. The other 15 or 20 times I have to bend over or get on my knees to find things. Doesn't it make sense to do it the other way? Yet I've found only two refrigerators with the freezer on the bottom.

For the past decade, refrigerator manufacturers have been diligently working to improve energy efficiency. As though it makes any difference. Where is the inefficiency of a refrigerator, really? Don't these people have any kids? Haven't they ever watched their kids standing in front of the fridge with the door wide open, trying to decide whether to have the chocolate-flavored Kool-Aid or the 90-percent-water "fruit juice," or maybe a hot dog—and then finally wander off to play Nintendo instead?

In the interest of true energy efficiency, then, how about making a door that the kids can see through? Grocery stores have had them for years. Move the light

switch to the outside so you can inspect the contents without opening the door. I figure that a transparent door would be held open for less time and would therefore save more energy than a super-efficient motor possibly could.

Here's another idea.

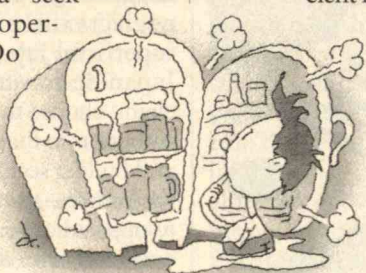
Most of us operate our refrigerators on the LIFO system—last in, first out. We put stuff in the fridge and the next time we put something in we push back the stuff in front of it.

The food that is "lost" at the back of my refrigerator would feed a family of four (not *my* family of four—by the time we find the stuff it doesn't qualify as food anymore).

Why not have rotating shelves? Just stick a big axle in the center so that each shelf becomes a rotating disc. I can hear the manufacturers objecting already: round shelves wouldn't work because things will fall off the edge into the corners. Well, why does the refrigerator have to be square? As if we didn't know. Because it has always been square. Well *shape up!* We're paying almost a thousand bucks for an empty box with a motor and a compressor that Thomas Edison could have made in his garage 100 years ago. The least they can do is spend a few minutes thinking about how people use it.

Cars and refrigerators happen to be my own personal pet peeves regarding ergonomic stupidity. I realize that in the case of refrigerators, this just results in inconvenience; but the consequences are much worse for cars (and therefore much more inexcusable). In fact, I have already instructed my heirs to sue the manufacturer of the car I'll be driving when I go to that big Junk Yard in the Sky. Because I know the accident will have occurred while I was equalizing my graphics. ■

THOMAS L. MAGLIOZZI teaches marketing at Suffolk University School of Management in Boston and is co-host, with his brother Ray, of "Car Talk," which broadcasts weekly on National Public Radio.



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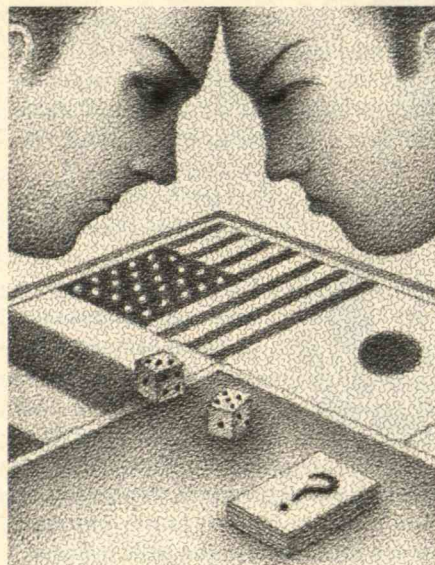
Head to Head
by Lester C. Thurow
William Morrow, \$25

BY ROBERT C. CRAWFORD

TO divine who will dominate the twenty-first century, economic pundits are training their telescopes on the success stories of the day, Japan and Germany. These analysts are vying to forge a post-Cold War agenda, and whoever nails down the new formulas—or simply develops the cleverest labels—will have a tremendous impact on future political debates. The trouble is, the arguments add up to a cacophony of contradictions: each expert telescope highlights the observer's pet cause, be it tax cuts, industrial policy, deregulation, or global ownership of production.

In *Head To Head*, Lester C. Thurow cuts a welcome swath through this confusing literature. With his shrewd eye for detail, Thurow offers a critical overview of the competing arguments and prescriptions. The United States, he believes, is still in the running with its top capitalist rivals. But the country's leaders, refusing to recognize the need for change, have failed to heed the new rules being created by Japan and Germany.

Economic competition, as Thurow sees it, has moved from complementary niches, determined in the past by the uneven resources of the trading countries, to a head-to-head confrontation among near equals. The "great wall" that protected U.S. industry—an educated work force, technological preeminence, and, above all, cash for investments—has slowly eroded; America's highest-paying jobs, and ultimately its



standard of living, have become vulnerable to assaults from abroad. The key to competitive advantage in the next century, Thurow argues, now lies in overarching strategies for organizing the productive capacities of nations and perhaps of entire continents.

And this, of course, is what the Japanese and Germans have done par excellence. According to Thurow, Japan pioneered producer economics in its purest form, a "communitarian" capitalism that subordinates all other social goals to strengthening national industries. Turning "Anglo-Saxon economics" on its head, it is the producers, and not the consumers or stockholders, who come first.

Many of the mechanisms of producer economics are well known. Japanese corporations, for example, band into *keiretsu*, huge business groupings that can include reciprocal ownership of stock, preferential treatment for members, and cartel-like market power to crush rival firms. By relieving pressure from stockholders for immediate profit, *keiretsu* enable member firms to take a longer-term perspective than their Western counterparts. Government, in this scheme, is a business adjunct, cooperating to protect infant industries and pouring resources into promising new technologies.

Winter for Japan

The big question is whether it is politically feasible to install a system of producer economics in the United States. In suggesting that it might be, Thurow neglects the rumblings beneath the superficial Japanese harmony, or *wa*. Japanese consumers do not, as many claim, choose to forgo present-day consumption so that businesses can invest in and build a secure empire somewhere in the future—they simply feel powerless to oppose corporate dictates, and almost everyone who dares challenge the system is condemned to the margins of society. ("Investigative" journalists routinely submit their pieces to their subjects for censorship, or are black-listed. Agitators, such as members of consumer groups, have little impact and risk losing their jobs if found out by their employers.) When Japanese corporations "dump" minivans or silicon chips abroad, they gouge consumers at home to subsidize American living standards—a practice that is tolerated, though bitterly resented. Producer economics works in Japan, but it exacts a very high price.

Despite this blind spot, Thurow correctly perceives the difficulties Japan will soon face. While expert in reverse engineering and imitation, Japanese researchers have yet to gain the ability to produce world-class breakthroughs. To truly invent, which would allow them to leap ahead of the pack, the Japanese would have to revamp their universities and research infrastructure, the preserve of notoriously stodgy and powerful bureaucracies.

Even worse, Japan remains isolated—if not alienated—from the rest of the world, unwilling or unable to accept its trading partners as equals. Because few outside manufacturers can penetrate Japan's internal market for industrial goods, Thurow predicts that the industrial nations will retaliate against its exports, long the engine of Japan's most dynamic sectors. China and the countries of Southeast Asia, despite Japan's multibillion-dollar manufacturing

investments there, may prefer to continue trading with the United States, which they view as an equitable partner rather than as their chief regional rival. Thus, Japan could soon find itself locked out of the huge new trading blocs that are forming around the United States and Western Europe, the other contenders for economic supremacy.

Springtime for Germany

Germany, Thurow believes, will lead the "House of Europe" to claim the twenty-first century. He argues that as Germany loosens its monetary and fiscal policies, its European partners will follow suit, ushering in an era of unparalleled growth that will exclude outsiders. As the world's largest unified market, Thurow contends, Europe will write the trade rules for everyone else.

But the combination of Europe's strategic assets is what's most important. Thurow writes: "If the high science of the former Soviet Union and the production technologies of the German-speaking world are added to the design flair of Italy and France and a world-class London capital market efficiently directing funds to Europe's most productive areas, something unmatched will have been created."

Perhaps. But dozens of other scenarios are equally plausible, and though Thurow focuses on some of them, they are far too complex to cover in one book. The economic conversion from communism, for example, is so tangled in ancient ethnic disputes that predictions are hazardous at best. To curtail immigration from Northern Africa, Thurow argues elsewhere in the book, the European Community will probably export lower-paying manufacturing jobs to Algeria, Morocco, and Egypt, similar to U.S. investments in Mexico. But the resurgence of Islamic fundamentalism, which threatens virtually every regime in North Africa, could create a new wave of political refugees, flooding Europe with more immigrants than ever before. Politics, after all, has a way of undermining even the most cogent economic forecasts.

Regaining Momentum

So where does all this leave the United States? No longer the world's largest single market, it could fall behind Japan and a resurgent Europe. Educational standards, the linchpin of concerted industrial policies elsewhere, continue to stagnate or decline in the United States despite presidential rhetoric; the same is true of investments to upgrade R&D, labor skills, infrastructure, and inner cities. Moreover, U.S. corporations are fleeing sectors targeted by the German and Japanese producer-economics giants. It is a bleak picture.

To recapture America's lost momentum, Thurow's formula mixes diverse strategies, all leading to producer economics. Without espousing managed trade, Thurow argues that U.S. trade negotiators should play hardball with recalcitrant Japanese officials, retaliating immediately against unpalatable trade practices such as dumping. At home, a national strategy to enhance education and labor skills is required, as is the targeting of high-value-added, growing industries for systematic development and protection. Finally, antitrust and banking laws should be changed to allow U.S. companies and financial institutions to form their own *keiretsu*.

All of this has been suggested before. What Thurow adds to the debate is his even tone; he avoids both the shrill denunciations of the younger Japanologists known as the revisionists and the fawning romanticism of the "Chrysanthemum Club"—those old-guard analysts like Ezra Vogel and Edwin Reischauer who dreamed up the fantasy of Japanese "consensus building." Japan's and Germany's successes must be studied, not blamed for problems at home; regardless of whether their practices are "unfair," says Thurow, U.S. survival may eventually mean playing by their rules.

As it lurches from crisis to crisis, the United States just may not be cut out to become a producer-economics state. Corporations, for example, are not yet willing to give up large profit margins to

gain market share, and anyway their stockholders would never stand for it. Nor are first-time homebuyers likely to go along with Thurow's proposal that they boost the savings rate by making down payments of 40 percent.

Head to Head is not always realistic, but at its best it yokes a burgeoning and chaotic literature into a coherent framework, a point of departure for useful political dialogue. If Thurow gets his readers to think and debate, he will have accomplished his purpose.

ROBERT J. CRAWFORD, a free-lance writer based in Boston, has been a policy analyst at the National Science Foundation's regional office in Tokyo and a columnist for the Far Eastern Economic Review.

BOOKS

SOWING HAVOC IN THE THIRD WORLD

The Violence of the Green Revolution
by Vandana Shiva
Zed Books (London), \$49.95/\$17.50

BY PATRICIA ADAMS

FORTY years ago the Green Revolution, a package of agricultural techniques that promised to end hunger in Third World countries forever, was hatched in the incubators of the Rockefeller and Ford foundations' agricultural research centers. Government, scientific, and corporate revolutionaries, with financing from the coffers of international aid institutions, set out to wipe the traditional agricultural slate clean in order to create anew. But the Green Revolution has often failed spectacularly. In her new book, *The Violence of the Green Revolution*, Vandana Shiva cogently exposes this failure, measured by destroyed ecologies, diminished biodiversity, disabled economies, and discontented populations.

Shiva, a physicist and environmental activist, takes us on a journey to see the Green Revolution's origin in the logic and premises of scientific inquiry in North American laboratories. She visits the halls of power of the international aid agencies, agricultural supply companies, and Third World governments to see it packaged. And she leads us to the farms of the Green Revolution's star pupil, the Indian Punjab region, to see its disastrous application.

In India as elsewhere, Shiva tells us, the Green Revolution started as a peace strategy: high-yield miracle crops would banish starvation and resource constraints to the dustbins of history, dousing the threat of communist insurgency and agrarian conflict. Yet the means in so daunting a task could not help but contradict the ends.

Breeding Vulnerability

The high-yield varieties of seeds developed in the network of some dozen international research centers would be better described as high-response varieties, because they were biologically engineered to translate large doses of fertilizers and water into increased food yields. Traditional crop varieties, fed the same diet, went haywire: they converted the heavy fertilizer doses into overall plant growth rather than into grain yields, resulting in crop losses when stems broke. Traditional crops were soon replaced with dwarf high-yield varieties that maximized grain yields but minimized other plant parts that farmers had relied on for animal fodder and to enrich soil.

The introduction of high-yield crops also eroded the genetic base of Third World agriculture. Complex mixtures and rotations of diverse traditional species of wheat, maize, millet, legumes, and oil seeds, ill suited to the new water and chemical regimes of the capital-intensive Green Revolution, were soon replaced by vast unrotated stretches of wheat and rice. But those "monocultures" came from a narrow genetic base. And as some of the new varieties were hybrids and not self-pollinating, farmers could no longer select



and cultivate seeds especially well suited to local ecological niches.

Uniformity bred vulnerability. Crop failure in the world of monoculture could spell financial ruin, threatening a farming family's survival. Pest outbreaks called for pesticides. But widespread use of pesticides without knowledge of or regard for nontarget insects and mites guaranteed unforeseen resurgences of pests.

Shiva's findings are corroborated by anecdotal and scholarly evidence elsewhere. After 15 years of collecting agricultural data from Indonesia, the International Rice Research Institute found that insecticides, though exorbitantly expensive, did not improve the country's rice yields. Rather, admitted this chief purveyor of high-yield rice varieties, the chemicals were wreaking havoc on Indonesian paddies by upsetting the delicate balance between pest and predator that had evolved over millennia of rice farming.

Before the Green Revolution, the brown planthopper was a minor pest in the rice crops of Java and north Sumatra. By the later 1970s, because it was resistant to the pesticides that were wiping out its predators, the planthopper devastated over 1.2 million acres, destroying 350,000 tons of rice—enough to feed 3 million people for a year. Efforts to eradicate the remarkably

resistant insect with higher doses of pesticide merely proved a costly failure.

When another brown planthopper plague appeared imminent in 1986, the Indonesian government reverted to pre-revolutionary techniques: it cut pesticide subsidies and banned many pesticides from rice fields. Within a year, pesticide use fell by more than half, natural predators thrived, and the planthopper population in pesticide-free fields declined by 75 percent. Crop yields soared, and the government saved a small fortune in agrochemical subsidies.

Shiva maintains that virtually everything the Green Revolutionaries touched turned to stone. The heavy use of water—high-yield wheat, for example, requires three times the irrigation of traditional varieties—hurt dry-land crops such as millet and oil seeds, and the land itself. What's more, irrigation often exceeded the land's drainage potential, causing waterlogging and salinization on an unprecedented scale. In India today, 25 million acres of canal-irrigated land are waterlogged and another 60 million acres are threatened with salinity. In the state of Uttar Pradesh, one massive irrigation project waterlogged 20 percent more land than it irrigated, reducing overall food production.

Reaping Debt

Just as the Green Revolution needs the brute force of chemical, water, and energy inputs, it also depends on subsidies and price supports paid out of government coffers and international loans. Even then, farmers don't get off scot-free. Their input costs keep rising as growing amounts of fertilizer and pesticides are needed to maintain yields, and as governments bail out of economically ruinous subsidy and support programs, leaving farmers with mounting debts. Economies, like ecologies, collapse if the signals are ignored long enough.

Confronted with declining farm profitability, farming populations rebelled. In the 1980s, Punjabi farmers organized to express their opposition to this new form of colonization. "For the past three

years, we have increasingly lost money from sowing all our acreage with wheat. We have been held hostage to feed the rest of India. We are determined that this will change," steamed a representative of a Punjab farm organization.

The debts created by the Green Revolution were not restricted to individual farmers. Most of the revolution's inputs—chemicals, seeds, machinery, dams, and irrigation systems—had to be imported. The necessary foreign exchange had to be borrowed from the World Bank and other international institutions promoting the Green Revolution, making this brave-new-world experiment in agricultural engineering a major contributor to the Third World's \$1.4 trillion debt.

Shiva blames the revolution on capitalism and market forces, yet her analysis and data show the opposite. Rather, government intervention allowed political and scientific elites to distort and overrule the complex economic transactions that had once served equally complex agricultural systems.

The real costs of the Green Revolution experiment are increasingly well documented, and Shiva's book—particularly in explaining how small farmers were dispossessed of land and choices—is an invaluable contribution to that body of knowledge. But even more important is her illustration of how remote science, when applied by brute government power aided by unaccountable funding institutions for the benefit of favored corporate interests, can diminish biodiversity, cause serious environmental damage, undermine economies, and create chaos for communities striving for decentralized governance. Through this process, one of the world's best stores of scientific knowledge—the accumulated wisdom embedded in the traditions, practices, and innovations of Third World farmers—can unravel. ■

PATRICIA ADAMS is executive director of the Canadian-based environmental group Probe International and author of *Odious Debts: Loose Lending, Corruption, and the Third World's Environmental Legacy* (Earthscan 1991).

BOOKS

TO PAINT THE TRUTH

*The Heritage of Giotto's Geometry:
Art and Science on the Eve
of the Scientific Revolution*
by Samuel Y. Edgerton, Jr.
Cornell University Press, \$39.95

BY JANE ANDREWS AIKEN

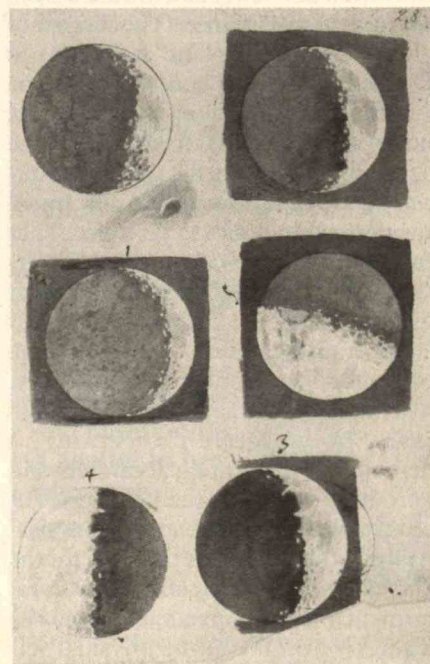
IN the late fall of 1609, Galileo Galilei climbed a windswept tower in Venice, trained his "perspective tube" on the moon, and discovered that Aristotle's mirror-smooth orb was unevenly strewn with high mountains and deep depressions. Like any avid academic of a postmedieval frame of mind, Galileo rushed his observations into print. His little volume, *Sidereus nuncius*, and its five astonishing engravings of the moon made history. What kind of history they made—and the place they assume in a scientific drama that has been characterized as "one damned revolution after another"—is in part the subject of Samuel Edgerton's latest book.

Galileo is one of the stars of this collection of eight essays by the eminent Williams College art historian that deal with the connections between art and science during the later Middle Ages and the Renaissance. The astronomer was a true artist-scientist who had mastered the subtleties of perspective, enabling him not only to see more than his contemporaries but also to judge more accurately what he had seen. As Edgerton argues in *The Heritage of Giotto's Geometry*, Galileo's understanding of the artist's geometrical model of space, vision, and light made it possible for the scientist to interpret the surface of the moon as craters and mountains rather than as a flat plain beset by a "strange spottedness," as had his contemporary Thomas Harriot.

Edgerton concerns himself mainly

with the revolutions taking place from about 1300 to 1600 in the way people perceived and represented the world around them. Edgerton describes this shift as an "escape from flatness." Medieval art, intended to bear witness to the divine presence in the world, portrayed figures as more or less suspended on an opaque ground and bathed uniformly in an ethereal gold light. There was little attempt to show depth or scale. But "modern" thinkers—theologians, mathematicians, artists, and engineers from the late thirteenth century onward—began to see themselves as observers of the material and spatial reality of the world. Reawakened to the great abstractions of Euclidean geometry and geometrical optics, they developed strategies for representing solid form shaped by light and shade and located in a defined space.

As in his several earlier published treatments of these same ideas, Edgerton shows how careful calculation of the angle of light, as well as scaled, proportioned, and measured distances, reverber-



Ink-wash drawings by Galileo show the mastery of light and shadow that enabled him to perceive—and portray—the moon's ruggedness.

ated in Renaissance art. According to Edgerton, Giotto di Bondone, the great Florentine painter and architect who died in 1337, was the first among his contemporaries to fully grasp the visual power of geometry. With that power he not only substituted a blue sky for a shimmering gold background but also reinvented the painter's tricks for creating a stirring illusion of apparently solid, earthbound figures struck by a clarifying light and moving deliberately through space. The new realism encouraged in scientists and engineers an ever more intense scrutiny of the surrounding world and provided the means for communicating a convincing picture of nature.

Found Illusions

In Edgerton's view, this visual revolution started in Assisi, at the upper church of the Basilica of St. Francis. There, in the 1290s, an anonymous artist painted an "illusionistic" border in which a series of modillions—small projecting architectural decorations—appear to converge away from the viewer and toward a common axis in the distance. (The concept of a single "vanishing point" had yet to be invented.) An earlier border in the same church depicts modillions that, typical of medieval art, seem to recede *toward* the viewer. For Edgerton, the newer, convergent modillions show that "a perceptual transformation began to take place in at least one thirteenth-century mind," perhaps none other than the mind of Giotto di Bondone.

The transformation captured by the lowly modillion motif prepared the way, says Edgerton, for a mathematically rigorous "perspective projection," a method for representing accurately and reproducibly the way that "the ratios of parts to whole correspond with physical reality." This in turn set the stage for the kind of literal, unambiguous visual communication appropriate to scientific inquiry—notably in the physical sciences, because of their dependence on careful analysis of forms.

By the 1430s, Italian artists had developed a vocabulary of pictorial conven-

tions useful to art and science alike. With these, artist/engineers like Giovanni Fontana represented "not just the surface but the covert interior of things, the essential structure that caused nature's exterior appearance in the first place."

One such convention is the "exploded" drawing. As Edgerton reports, Mariano di Jacopo (called Taccola, or the "Archimedes of Siena") created the first known exploded drawing—a depiction of how the parts of a gun barrel fit together—in 1427. By the 1440s, Taccola had expanded to cut-away and transparent views of various machines, exposing their inner workings and allowing judgment of their technical strengths or weaknesses. Edgerton goes on to suggest that Francesco di Giorgio Martini's engineering treatise of the 1470s remained influential for decades precisely because it accurately portrayed the shape of machines and the relative position of three-dimensional forms in space, clarified by light and shade.

Edgerton also makes a plausible case that the newly rationalized perspective image shaped the direction of early modern science and technology in such fields as mapmaking, anatomy, and mineralogy, as seen in the accomplishments of pioneers like Christopher Columbus, Andreas Vesalius, and Georgius Agricola. He goes on to propose that Renaissance artists caused a "sea-change in visual thinking, eventually influencing the education of Galileo, William Harvey, René Descartes, and Isaac Newton."

While the inclusion of Descartes seems to me a bit of a stretch, there can be little doubt that Galileo was sensitive to the meaning of shifting lights, shadows, and planes in space because of his familiarity with the new pictorial conventions. In fact, Galileo himself was so able a practitioner of these techniques that as a young man in 1588 he applied for a job teaching perspective and chiaroscuro (light and shadow) at the Florentine Academy of Drawing, and was eventually elected to membership. Harriot, his English contemporary, lived in a country where Italian artistic inno-

ventions were slow to catch on. So even though his telescopic observations of the moon beat Galileo's by more than a year, it took a true Renaissance man to guess the nature of the lunar surface.

Truth in Flatness

While Edgerton does a good job of sensitizing his readers to the Renaissance representational principles that have sharpened artists' and scientists' vision ever since, I find his book frustrating for its omissions and excesses. For example, he peremptorily dismisses Leonardo da Vinci, the most elegant Renaissance apologist for the interdependence of art and science. I also had difficulty swallowing some of Edgerton's more novel enthusiasms, like his zealous quest for a moment of cataclysmic change in world perception around 1100.

Especially bothersome is Edgerton's disregard for the ways in which medieval flatness can convey its own sort of truth. While Renaissance perspective renderings of a regular solid more nearly approximate visual truth, classical and medieval mathematical diagrams are anything but naive. Solids that have been squashed onto a single plane—so that a cylinder becomes two parallel lines with a circle on either end, or a pyramid becomes a triangle appended to a square—may look primitive to twentieth-century eyes, but they preserve line lengths and angles in ways that foreshortened images do not. Mathematicians like Euclid and Archimedes used such diagrams as substitutes for mathematical proof, and they should be regarded as potent communicators of mathematically significant information.

Artists and scientists would agree that many different kinds of geometry can enhance the truth of an image. "The eye does not see things but images of things that mean other things," wrote Italo Calvino in *Invisible Cities*. Leonardo and Galileo would have understood. ■

JANE ANDREWS AIKEN is an assistant professor of art history at Virginia Polytechnic Institute and State University.

tions increases the demand for sophisticated business services.

Moreover, families today are busy: more of their members are in the wage-labor market, making clothing and computers, and they're working longer hours than at any time since the end of World War II. As a result, they rely on restaurants, commercial entertainment, and child care services. This constitutes yet another reason why the service sector is growing as productive activity expands.

Also, while no one doubts that the working class is now less likely to wear blue collars, managers in the brave new workplaces of insurance, banking, and fast food are missing the boat by organizing a lot of service work on the model of the factory assembly line (complete with pacing by machines) and ignoring the potentially more productive model of self-managed teams.

All of this suggests that "industrialism" is alive and well, in both the social and the technical divisions of labor.

BENNETT HARRISON
Professor of Political Economy
Carnegie Mellon University

WILD TIMES AT THE BOARD OF ED

Laura van Dam's interview with Mathilde Krim ("Fighting the Plague," *TR* July 1992) presents a comprehensive account of Dr. Krim's laudable campaign against AIDS.

However, the caption for one of the accompanying photographs might raise troubling questions among the *TR* readership. It says that "in 1991 Mathilde Krim testified in favor of condom distribution at the New York City Board of Education"—which could be construed to mean that members of the board run a greater risk of contracting AIDS than the rest of the U.S. population.

For appropriate reassurance, I advise correcting the caption to read, "Appearing before the New York City Board of Education in 1991, Mathilde Krim testified in favor of condom distribution."

VINCENT W. FRANCO
Bethesda, Md.

Classifieds

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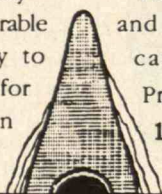
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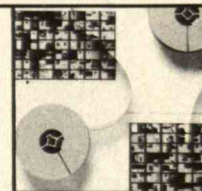
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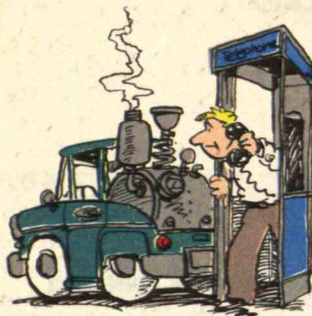
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Notes

EDITED BY PHILIP LoPICCOLO



Dial M for Methanol

If you'd like to know more about alternative fuels for cars, trucks, or other vehicles but don't know where to turn, consider the Department of Energy. The agency has created the Alternative Fuels Hotline, which can be reached at 1-800-423-1DOE, because there was no one place to get "fuel-neutral" information, says project manager Linda Bluestein.

Rather than relying on fuel-specific industry groups, the hotline taps the Alternative Fuels Data Center at the National Renewable Energy Laboratory, which has collected performance figures on government fleet vehicles and information on some 400 alternative refueling stations across the country.

Since its introduction this past summer, the hotline has averaged 25 calls per day from fleet managers, consultants, suppliers, researchers, government energy officials, and a host of other users and developers.

If current interest is any indication, compressed natural gas is the alternative fuel of choice. More callers (36 percent) referred to it than they did any other fuel, including ethanol (20 percent), methanol (18 percent), liquid propane gas (13 percent), and hydrogen (11 percent).

Seeing Red

The notion that beauty is in the eye of the beholder may be true in more ways than one. Most eyes contain three pigments—red, green, and blue—which absorb different wave-

lengths of light and send signals to the brain so that it can precisely calculate which colors we see. But according to research led by geneticist Jeremy Nathans at Johns Hopkins University, some women's eyes may have two different red pigments, enabling them to see subtle color differences that are imperceptible to other women and men.

The gene for each of the red-sensitive pigments is found on the X chromosome, Nathans says. That means that men, who have only one X chromosome, can have only one or the other red pigment, while women, who have two X chromosomes, may have genes for both.



Animated Newspapers

Want all the action of television news with the in-depth reporting of newspapers in one source? Students on the staff of the *Stanford Daily* are putting together an electronic publication—complete with text, sound, video, computer graphics, and animation—that they hope will not only combine the best features of newspaper and television reporting but also offer readers greater control over the material than is possible with either medium.

For example, one story slated for the premier edition of the *Stanford MediaLink*—which

will be distributed over the university's communications network to more than 8,000 Macintosh computer users—will profile Stanford students who participated in the summer Olympics. Readers can scroll through the text and search for key words or press small icons to watch videos of the athletes performing or speaking. Because the videos can be started or stopped at will, says project manager Scott Kirk, readers can decide not only what to view but also how much to view.

Back-to-Basics Training

Developers of flight simulators have long been making their computer-generated environments ever more realistic. But recent studies conducted at the University of Illinois suggest that the emphasis on realism may be misguided, at least for first-time flyers. Gavin Lintern, a psychologist at the university's Institute of Aviation, discovered that using simple schematic displays of the horizon and the runway—rather than higher fidelity images of buildings, trees, cornfields, and other details—reduces by as much as 15 percent the amount of landing practice a student requires before qualifying for solo flight.

Lintern offers one possible explanation. Whenever would-be pilots attempt to land a plane by simulator for the first time, their natural tendency is to overcompensate when making fine adjustments to the cockpit controls. But when the visual feedback is richer—when the pilots see realistic buildings and trees rushing toward them, for instance—they may panic and cause the plane to lurch. As a result, he says, they develop a bad habit that is hard to break.



Life Without Light

From our very first science classes we learned that energy from the sun is the source of all life. But recent discoveries—that living organisms are sustained by chemical energy sources deep within the earth's crust—have altered that basic tenet as well as shaken up theories about the possibility of life on other planets.

The earth's interior is a "deep, hot biosphere," says Cornell astrophysicist and geophysicist Thomas Gold, where bacteria thrive on hydrogen and methane that percolate up through cracks from the earth's interior. While directing a deep-rock drilling project in Sweden, Gold discovered evidence of microbial life in bedrock more than five kilometers down. He also points to evidence of bacterial remains in oil and coal and to similar forms of life found feeding on the hydrogen and methane rising through vents in the ocean floor.

"Because every solid planet has similar circumstances, with hot interiors and chemical processes," Gold suggests that future space missions look for evidence of biological forms in samples taken from the interior of other planets such as Mars, where huge landslides have exposed material that was initially more than two kilometers deep.

"The surface life on earth, based on photosynthesis for its overall energy supply, may be just one strange branch of life in the universe," he says, "while the deep, chemically supplied life may be very common."



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